Strata® DK8 & DK16

Digital Key Telephone Systems

DK8 & DK16

INSTALLATION AND MAINTENANCE MANUAL

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SERIAL NO. DK8 & DK16

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Strata® DK8 & DK16

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Strata® DK8 & DK16

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CHAPTER ONE
INTRODUCTION

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1 PURPOSE

1.00 The purpose of this section is to provide detailed step-by-step instructions for installing the STRATA DK8 and STRATA DK16 systems.

1.01 This chapter provides an overview of the entire installation section, and includes a list of reference documentation that supports the installed system; a list of system mnemonics is also provided.

2 ORGANIZATION

2.00 This manual is organized in modular chapters for easy removal and replacement of updated materials. The chapters are as follows:

Chapter One	-	Introduction
Chapter Two	-	Site Requirements
Chapter Three	-	System Configuration
Chapter Four	-	STRATA DK8 KSU and PCB Installation
Chapter Five	-	STRATA DK16 KSU and PCB Installation
Chapter Six	-	Station Apparatus Installation
Chapter Seven	-	Peripherals Installation
Chapter Eight	-	System Wiring and Main Distribution Frame Arrangements

3 REFERENCE DOCUMENTATION

3.00 The STRATA DK8 and DK16 digital key systems are supported by the following complement of reference documentation:

3.10 General Description: An overview of the STRATA DK8 and DK16 systems and their features.

3.20 Programming: Detailed step-by-step instructions on how to enter data in the System Record sheets, and how to program the system from the completed System Record Sheets. LCD responses are included to provide clear guidance for the programmer.

3.30 User Guides: Detailed step-by-step guides on how to operate digital telephones, electronic telephones, standard telephones, direct station selection consoles, add-on modules and data interface units.

3.40 Fault Finding Procedures: Hardware troubleshooting and diagnostic information presented in flowchart form.

3.50 Remote Maintenance and Administration: Programming and maintenance procedures specially adapted for remote maintenance and administration terminal use. Detailed, step-by-step instructions are provided, complete with the terminal responses.

4 SYSTEM MNEMONICS/TERMS

4.00 Mnemonics are used to identify the system's hardware, operation, and features. The following alphabetical listing describes the mnemonics used in this manual.

ADM: Add-on Module—A telephone upgrade that provides 20 Direct Station Selection (DSS) buttons with busy LED indication on STRATA DK16 and 10 DSS buttons plus 8 speed dial buttons (one for every station), one night transfer and one all call page button on STRATA DK8. Can be installed on any or all 2000-series Digital Telephones in the system. Attaches to the telephone and uses the same port assigned to the telephone. ADM buttons are fixed and cannot be changed in system programming.

BPS: Bits Per Second—Unit of measure that refers to the transmission speed (baud rate) of electronic signals. It is used when describing data interface unit and modem operation.

CO: Central Office—The facility which houses switching equipment that provides telephone service (CO lines, Centrex lines, etc.) for the immediate geographical area.

CO Line: A term used to define the STRATA hardware circuit that connects to the Central Office network line pair. Each CO line is assigned a CO line number in system software.

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CODECs: Coder/Decoders—Semiconductors that allow the system to process analog-to-digital and digital-to-analog conversions.

DDCB: Digital Door Phone/Lock Control Unit—A peripheral hardware unit that can be connected to designated digital telephone circuits/ports. The DDCB has three interfaces, two of which are dedicated to door phones (MDFB), and one that can be connected to a MDFB or a door lock.

DISA: Direct Inward System Access—A feature available for CO lines that allows an outside party to access a STRATA system's internal stations or outgoing CO lines without going through an operator or automated attendant. An optional security code and/or account codes may be set to prevent unauthorized access to outgoing CO lines for through system calling.

DK: Digital Key.

DKSU8: Key Service Unit (STRATA DK8 only)—The standard key service unit which includes the system's motherboard, power supply, two CO line circuits, four digital telephone circuits, relay service, and interface for Music-on-hold (MOH)/Background Music (BGM) and External Page.

DKSUB16: Base Key Service Unit (STRATA DK16 only)—The standard key service unit which includes the system's motherboard, power supply, four CO line circuits, eight digital telephone circuits, relay service, and interface for Music-on-hold (MOH)/Background Music (BGM) and External Page.

DKSUE16: Expansion Key Service Unit (STRATA DK16 only)—The optional key service unit which has four universal slots that can support CO line, station, and external option printed circuit boards that are compatible with the larger STRATA DK systems (DK24/DK56/DK96).

DSS: Direct Station Selection Console (STRATA DK16 only)—A console designed to facilitate the processing of a heavy load of incoming calls.

There are two types of DSS consoles: the DDSS console and the HDSS console. The chief difference between them is that the DDSS console can be connected to designated digital telephone circuits, while the HDSS console can only be connected to designated electronic telephone circuits.

DTMF: Dual-tone Multi-frequency—Push-button dialing.

DVSU: Off-hook Call Announce Upgrade—A subassembly that allows a digital telephone to receive Off-hook Call Announce.

EOCU: Off-hook Call Announce Upgrade (STRATA DK16 only)—An optional subassembly to the Electronic Telephone Interface Unit PCB (PEKU) or Standard/Electronic Telephone Interface Unit (PESU) that provides support for electronic telephones that must receive Off-hook Call Announce. Electronic telephones that must receive Off-hook Call Announce must also have an HVSU2 subassembly or the combined HVSU/HVSI subassemblies.

FCC: Federal Communication Commission—The telecommunication industry's federal regulatory agency. All Toshiba hardware is FCC listed or approved.

HESB: External Speaker Box—A speaker/amplifier that can be configured with the system and telephones to provide a variety of functions.

HESC-65A: A cable that connects an HHEU-equipped digital telephone or electronic telephone to an HESB for a Loud Ringing Bell .

HHEU: Loud Ringing Bell/Headset Jack Interface Upgrade—A small subassembly for use inside a digital telephone or a 6500-series electronic telephone that allows a speaker (HESB) and/or a headset to be installed with the station.

HVSU2: Off-hook Call Announce Upgrade—A subassembly that enables an electronic telephone to receive Off-hook Call Announce.

IMDU: Remote Maintenance Modem Interface Unit (STRATA DK16 only)—A subassembly installed on a PIOU or PIOUS PCB in the optional DK16 Expansion Key Service Unit that allows the system to be connected with a remote maintenance/administration terminal.

KCDU: CO Line/Digital Telephone Interface Unit (STRATA DK16 only)—Optional printed circuit board providing two loop start CO line circuits and four digital telephone circuits that can be installed in the Expansion Unit. The digital telephone circuits support the same devices as the PDKU except for the DDSS console.

KCOU: CO Line Interface Unit (STRATA DK16 only)—Factory-installed printed circuit board that comes standard with the Base Key Service Unit to provide four loop start CO line circuits. Available as a spare unit for field replacements.

KFCU: (STRATA DK16 only) Option feature cartridge that plugs into the Base Unit to provide feature upgrades to DK16.

KPSU16: (STRATA DK16 only) Power supply that comes factory-installed in the Base Key Service Unit. This power supply provides power to the entire system, in its standard and expanded configurations. Available as a spare unit for field replacements.

K4RCU: (STRATA DK16 only) Optional unit that can be installed in the Base Key Service Unit to provide a 4-circuit Dual-tone Multi-frequency receiver for CO lines and standard telephones. It also provides busy tone detection for Auto Busy Redial.

KSTU: Standard Telephone Interface Unit (STRATA DK16 only)—Optional printed circuit board that can be installed in the Base Key Service Unit to provide four standard telephone circuits.

LCD: Liquid Crystal Display—Display used for messaging, identification, and status that appears on some digital and electronic telephones.

LED: Light Emitting Diode—Status indicators located on printed circuit boards, digital telephones, and electronic telephones.

LSI: Large Scale Integration—Related to circuit design technology. STRATA DK8 and STRATA DK16 printed circuit boards use LSI circuit design.

MDF: Main Distribution Frame—The wiring frame usually located in a phone closet.

MDFB: Door Phone Box—A peripheral two-way speaker box option. Each MDFB connects to a DDCB. A DDCB can support as many as three MDFBs.

OCA: Off-hook Call Announce.

PBX: Private Branch Exchange—Industry-standard term which refers to a telephone switch, usually on-premises, which serves an individual company, and is connected to a public telephone exchange through the CO.

PCB: Printed Circuit Board.

PCM: Pulse Code Modulation—A widely used form of digital telephone switching.

PCOU1: CO Line Interface Unit (STRATA DK16 only)—A printed circuit board that can be installed in the optional Expansion Key Service Unit to provide the system with four loop start CO lines circuits.

PCOU2: (STRATA DK16 only) The PCOU2 is a direct replacement for the PCOU1. Their fit/form/function is identical; however, for manufacturing reasons, the PCOU1 was phased out in favor of the PCOU2.

PDIU-DI/PDIU-DI2: Integrated Data Interface Unit—Replaces the normal digital telephone base to enable the telephone to transmit and receive data between a terminal/personal computer connected to the telephone and data devices connected to other PDIU-DIs, or to modems, printers, and computers connected to

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Stand-alone Data Interface Units (PDIU-DSs). The PDIU-DI is also used to provide personal computer access to outside dial-up data services and/or bulletin boards.

NOTE:
The PDIU-DI and the PDIU-DI2 are identical, except that the PDIU-DI attaches to 1000-series Digital Telephones, while the PDIU-DI2 attaches to 2000-series Digital Telephones.

PDIU-DS : Stand-alone Data Interface Unit—Used for modem pooling, printer sharing, and access to a host/mainframe computer.

PDKU1: Digital Telephone Interface Unit (STRATA DK16 only)—A printed board that can be installed in the optional Expansion Key Service Unit to provide the system with eight digital telephone circuits. In addition to digital telephones, the PDKU can support data interface units (Stand-alone and Integrated), a digital DSS console (DDSS), and a digital door phone/lock control unit (DDCB).

PDKU2: Digital Telephone Interface Unit (STRATA DK16 only)—Provides same function as the PDKU1, except that the PDKU1 can only support data interface units on Circuits 1 ~ 7, while the PDKU2 can support data interface units on Circuits 1 ~ 8.

PEKU: Electronic Telephone Interface Unit (STRATA DK16 only)—An optional PCB that provides the system with eight electronic telephone circuits, which can support electronic telephones, a Background Music source, an electronic DSS console (HDSS), and an amplifier for two CO line conference calls.

PESU: Standard/Electronic Interface Unit (STRATA DK16 only)—A printed circuit board with two standard telephone circuits and four electronic telephone circuits that can be installed in the optional Expansion Key Service Unit. The electronic telephone circuits can support the same devices as the PEKU, except for the HDSS console. The standard telephone circuits can support the same single-line devices as the KSTU and the PSTU.

PFT: Power Failure Transfer Interface—Dedicated standard telephone interface located on the motherboard in the DKSUB16 (STRATA DK16) or DKSU8 (STRATA DK8) to provide emergency service during a system power failure.

PIOU: Option Interface Unit (STRATA DK16 only)—A printed circuit board that can be installed in the optional Expansion Key Service Unit to provide support and/or circuit interface for optional hardware peripherals and upgrades.

PIOUS: (STRATA DK16 only) The same as the PIOU, except the PIOUS has one external paging interface zone, while the PIOU has four.

NOTE:
The system cannot support the PIOU and PIOUS simultaneously. Only one or the other can be installed.

PORT: There are two types of ports: physical and logical. A physical port is an actual station circuit location; a logical port is the set of characteristics—features, station intercom number, etc.—assigned to the physical port. Logical ports are mobile. They can be moved from one physical port to another.

PBTC: A Toshiba-supplied cable used to connect customer-supplied batteries to the power supply in the DKSUB for emergency reserve power.

PPTC: (STRATA DK16 only) A Toshiba-supplied adapter that is used to connect the modular SMDR and/or maintenance ports to the DB-25 connector of a printer, terminal, modem or call accounting machine. The SMDR/Maintenance (TTY) port is located on the optional QSMU PCB (STRATA DK8), or PIOU or PIOUS PCB (STRATA DK16).

PSTU1: Standard Telephone Interface Unit (STRATA DK16 only)—A printed circuit board with a built-in ring generator that can be installed in the optional Expansion Key Service Unit to

provide interface for eight standard telephones or optional hardware peripherals (voice mail devices, fax machine, Background Music source, etc).

PSTU2: Standard Telephone Interface Unit (STRATA DK16 only)—Provides the same function as the PSTU with the addition of a switch to select high or low ringing generator voltage.

QCDU: CO Line/Digital Telephone Interface Unit (STRATA DK8 only)—Optional printed circuit board providing one loop start CO line circuit and two digital telephone circuits that can be installed in the KSU. A maximum of two QCDUs may be installed in the DK8.

QCNU: Conference Unit (STRATA DK8 only)—Standard factory-installed printed circuit board provides two conference circuits that can be installed in the KSU. The PCB allows two simultaneous conferences: four parties for the first, and three parties for the second simultaneous conference.

QPSU: (STRATA DK8 only)—Power supply that comes factory-installed in the KSU. This power supply provides power to the entire system. Available as a spare unit for field replacements.

QRCU: Optional printed circuit board that can be installed in the KSU to provide a 3-circuit Dual-tone Multi-frequency receiver for DISA CO lines and standard telephones. It also provides busy tone detection for Auto Busy Redial.

QSMU: SMDR/TTY Interface Unit (STRATA DK8 only)—Optional printed circuit board which provides either SMDR, or Remote Maintenance Terminal (TTY) or external modem interface. QSMU configuration is selectable in system programming.

QSTU: Standard Telephone Interface Unit (STRATA DK8 only)—Optional printed circuit board that can be installed in the KSU to provide two standard telephone circuits.

RAM: Random Access Memory—Refers to the type of system memory that holds individual system configuration and feature programming. RAM is read/write memory, and can be easily revised in programming.

ROM: Read Only Memory—Refers to the type of system memory that holds static software that comprises the mechanics of the features' functions. ROM is only revised by Toshiba software engineers.

4.10 Use of Notes, Important Notes, Cautions, and Warnings

4.11 Notes call attention to specific items to elaborate, or to refer the reader to other information.

4.12 Important Notes are used when the information is considered to be very important.

4.13 Cautions call attention to the possibility of equipment being damaged if the instructions are not followed closely.

4.14 Warnings are used when the given tasks involved could cause the possibility of personal injury or death to the technician.

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INSTALLATION

CHAPTER TWO
SITE REQUIREMENTS

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TABLE LIST

FIGURE LIST

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1 GENERAL

1.00 This chapter defines the installation site requirements necessary to ensure a proper operating environment for the STRATA DK8 and DK16. Also included are grounding requirements.

2 INPUT POWER REQUIREMENTS

2.00 The system requires an input power source of 117VAC nominal (85VAC ~ 135VAC), 50/60 Hz, 15 amps. The AC outlet is recommended to be *dedicated* and unswitched, with a solid third wire ground (refer to Paragraph **4**). This is to eliminate interference from branch circuit motor noise or the like, and to prevent accidental power-off.

2.01 To avoid accidental power turn-off, it is recommended that an ON/OFF wall switch *not* be used on this dedicated AC circuit.

2.02 An option Reserve Power Battery and Charger (HPFB) is available for use with the STRATA DK8 to serve as a power failure backup. For the STRATA DK16, a reserve power source (two customer-supplied 12-volt batteries) may be connected to the system to serve as a power failure backup.

3 SITE CONSIDERATIONS

3.00 Clearance and Location Requirements

3.01 The key service units must be wall mounted. Figure 2-1 shows the minimum clearance requirements for the STRATA DK8 system, and includes the recommended mounting location and clearance requirements for the optional HPFB. Figures 2-2 (Base Key Service Unit) and 2-3 (Base and Expansion Key Service Unit together) show the minimum clearance requirements for the standard

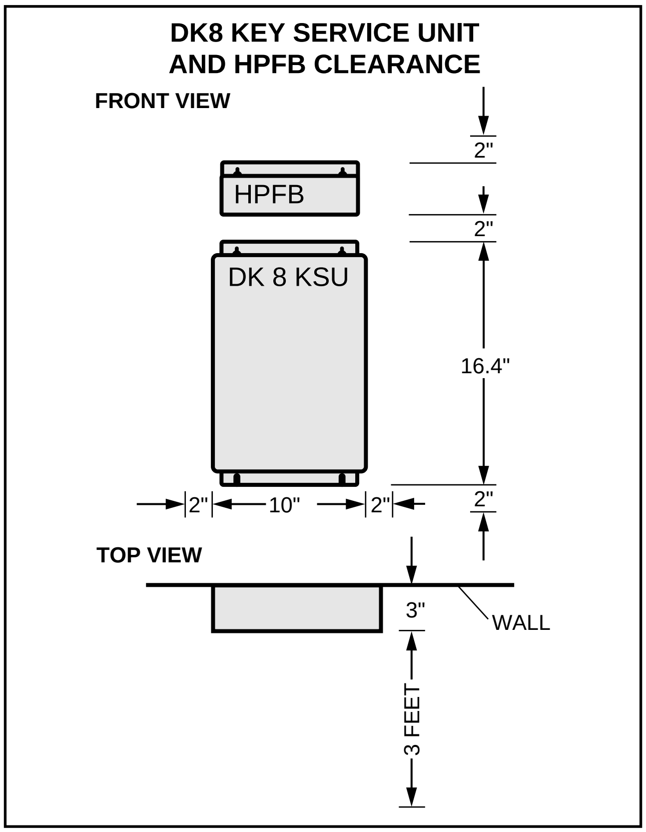


FIGURE 2-1
DK8 KEY SERVICE UNIT AND HPFB MINIMUM CLEARANCE REQUIREMENTS

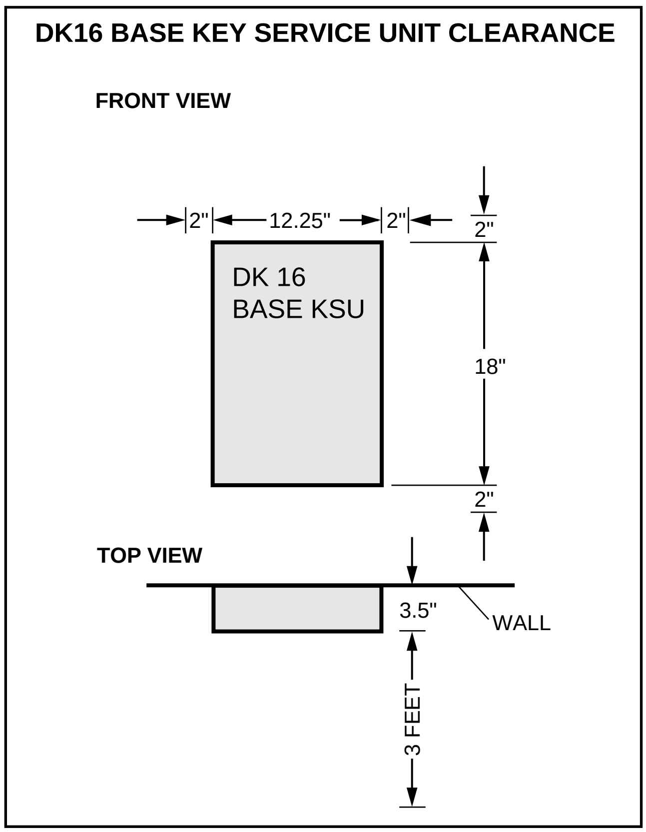


FIGURE 2-2
DK16 BASE KEY SERVICE UNIT MINIMUM CLEARANCE REQUIREMENTS

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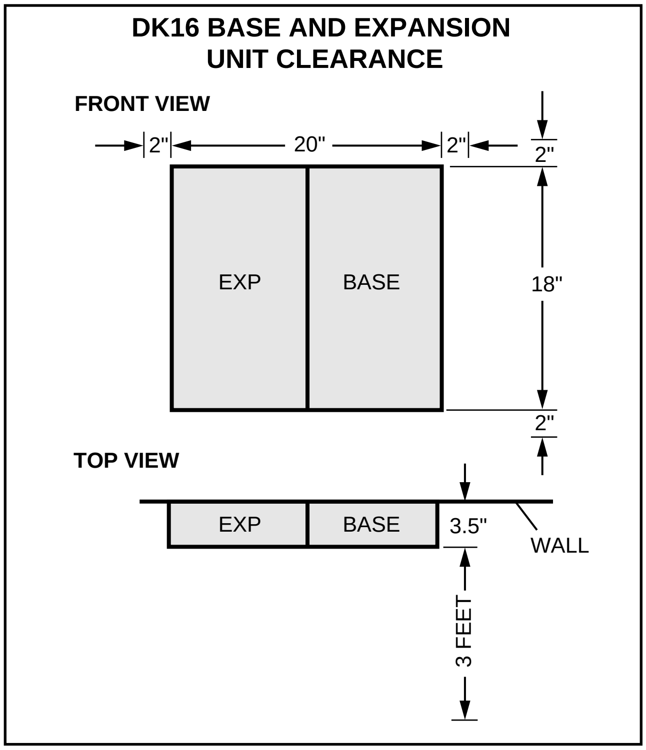


FIGURE 2-3
DK16 COMBINED BASE AND EXPANSION KEY SERVICE UNIT MINIMUM CLEARANCE REQUIREMENTS

and optioned STRATA DK16 system. Refer to Chapter **4** for DK16 key service unit wall mounting instructions.

3.02 The following conditions must be considered when selecting a location for the key service unit(s):

The location MUST BE:
- Dry and clean
- Well ventilated
- Well illuminated
- Easily accessible

The location MUST NOT BE:
- Subject to extreme heat or cold
- Subject to corrosive fumes, dust, or other air-borne contaminants
- Subject to excessive vibration
- Next to television, radio, office automation, or high frequency equipment

3.03 If reserve power is to be installed for the STRATA DK16, the batteries will require a well-ventilated location close (within nine feet) to the DKSUB16 (the optional Toshiba-supplied battery cable is 9 feet in length). The STRATA DK8 reserve battery (HPFB) should be mounted directly above the DKSU8 as shown in Figure 2-1.

3.10 Electrical/Environmental Requirements and Characteristics

3.11 The electrical/environmental requirements and characteristics for each system are provided in Table 2-A.

4 GROUNDING REQUIREMENTS

4.00 The systems require a solid earth ground for proper operation. Failure to provide ground may lead to confusing trouble symptoms and, in extreme cases, system failure. The AC power cord contains a conductor for the "third wire ground" provided by the commercial power outlet. The third-wire ground should be the only ground necessary for the DK8/DK16; this ground must originate at the buildings main power distribution panel and have a solid connection to earth ground. (Figure 2-4)

4.10 Third Wire Ground Test

4.11 Test the "third wire ground" for continuity by either measuring the resistance between the third prong terminal (earth ground) and a metal cold water pipe (maximum: 1 ohm), or by using a commercially available earth ground indicator. If neither procedure is possible, perform the following earth ground test procedure:

WARNING!
Hazardous voltages that may cause death or injury are exposed during the following test. Use great care when working with AC power line voltage.

1) Obtain a suitable voltmeter, and set it for a possible reading of up to 250 VAC.

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TABLE 2-A
SUMMARY OF ELECTRICAL/ENVIRONMENTAL CHARACTERISTICS

GENERAL

Primary power Input AC AC frequency Power	 85 ~ 135VAC 50/60 Hz DK8-46 watts maximum, DK16-75 watts maximum
Environmental specifications Operating temperature Operating humidity Storage temperature	 32 ~ 104°F (0 ~ 40°C) 20 ~ 80% relative humidity without condensation - 4 ~ 158°F (-20 ~ 70°C)
Power supply DC voltage output specification	DK16 –24VDC: (–26.3 ~ –27.8VDC) +5VDC: (+4.5 ~ +5.5VDC) –5VDC: (–4.5 ~ –5.5VDC) DK8 +24VDC: (+26.3 ~ +27.8VDC) +5VDC: (+4.5 ~ +5.5VDC) Note: +5V converter on KSU PCB
Battery charger characteristics (DK16 only)	Charger: current limiting Nominal float voltage: 2.275 volts/cell Charge current: 0.7 amps maximum Battery discharge cut-off voltage: 20.5 ± 0.5VDC
QSTU, KSTU, PSTU or PESU (circuits 1 & 2) Ring voltage	Square wave output with high/low option jumper: Low position, 130 ± 20VDC peak–to–peak (no-load) High position, 190 ± 25VDC peak–to–peak (no-load)
Ringing capability	Two ringers maximum per circuit, high or low position

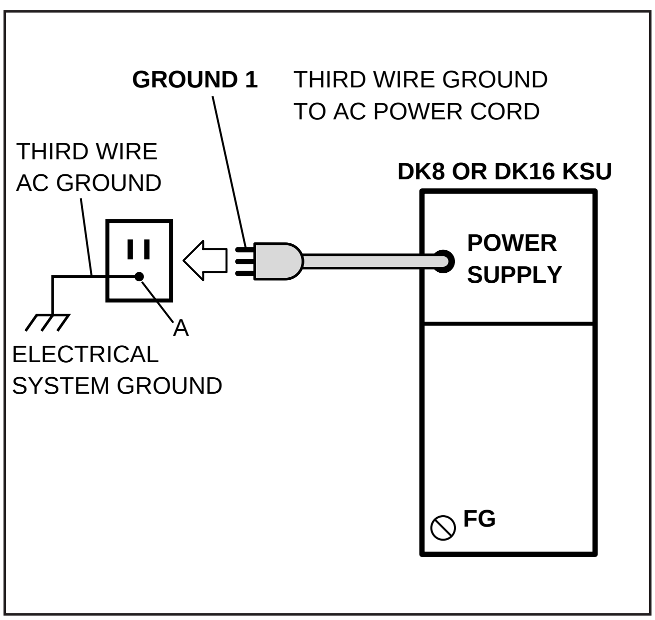


FIGURE 2-4
KSU GROUNDING DIAGRAM

2) Connect the meter probes between the two main AC voltage terminals (white and black wires) on the wall outlet. The reading obtained should be between 100 ~ 120 VAC.

3) Move one of the meter probes to the third terminal (green wire ground). Either the same reading or a reading of zero volts should be obtained.

4) If the reading is zero volts, leave one probe on the ground terminal and move the other probe to the second voltage terminal.

CAUTION!
If a reading of zero volts is obtained on both voltage terminals (white wire to green wire, black wire to green wire), the outlet is not properly grounded. Omit steps 5 and 6, and proceed directly to step 7.

5) If a reading of zero volts on one terminal, and a reading of 100 ~ 120 VAC on the other terminal is obtained, remove both probes from the outlet.

6) Set the meter to the "OHMS/Rx1" scale. Place one probe on the ground terminal, and the other probe on the terminal that produced a reading of zero volts. The reading should be less than 1 ohm.

CAUTION!
If the reading is more than one ohm, then the outlet is not adequately grounded.

7) If the above tests show the outlet is not properly grounded, the condition should be corrected (per Article 250 of the National Electrical Code) by a qualified electrician before the system is connected.

4.20 Alternate or Additional Ground

4.21 If the "third wire" AC ground can not practically be improved or if extreme motor noise or other disturbance causes system malfunction, or if local area lightning storms exist, a separate direct ground may be warranted.

4.22 Connect a separate earth ground from a cold water pipe or earth grounding rod directly to the FG screw terminal on the DK8/DK16 power supply. See Figure 4-5 of **Section 100-816-204** (for STRATA DK8) or Figure 5-8 of **Section 100-816-205** (for STRATA DK16).

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CHAPTER THREE
SYSTEM CONFIGURATION

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TABLE LIST

WORKSHEETS

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1 INTRODUCTION

1.00 This chapter offers guidelines and considerations on how to configure a STRATA DK8/DK16 system, which can support a wide variety of stations and peripherals.

2 SYSTEM CAPACITY

2.00 Total System Capacity

2.01 The STRATA DK8/DK16 systems have a modular design which allows them to support a number of station and CO line configurations. The main component of each system is the Key Service Unit. The DK8 KSU can have up to 10 stations and four CO lines. The DK16 Base Key Service Unit can have up to 12 stations and four CO lines. An Expansion Key Service Unit can be added to the DK16 to increase the station capacity to 20 and the CO line capacity to eight. Station and CO line configurations are shown in Table 3-A (for DK8) and Table 3-B (for DK16).

2.10 The DK8 Key Service Unit

2.11 Station and CO Lines. The DK8 Key Service Unit comes standard with four digital telephone circuits (ports) and two CO line circuits (Table 3-C). An optional printed circuit board called the QCDU can be added to the KSU to provide one CO line circuit and two digital telephone circuits. A maximum of two QCDUs may be added to provide a total of four additional digital telephone circuits and two additional CO line circuits. Another optional printed circuit board called the QSTU can be added to the DK8 KSU to provide two standard telephone circuits.

2.12 Peripherals. The DK8 Key Service Unit can support a number of peripherals, which are not considered as stations and do not affect the maximum station and CO line capacities. A customer-supplied Music-on-hold source, optional reserve power battery and charger, a customer-supplied emergency standard telephone for system power failure occurrences and an amplifier with speaker for paging and night ringing can all be connected to the Key Service Unit (Table 3-C). A relay contact is also provided to control one of the following peripherals: Music-on-hold source, night bell, or page amplifier mute control.

2.20 The DK16 Base Key Service Unit

2.21 Station and CO Lines. The DK16 Base Key Service Unit comes standard with eight digital telephone circuits (ports) and four CO line circuits (Table 3-D). An optional printed circuit board called the KSTU can be added to the unit to provide four standard telephone circuits (ports).

2.22 Peripherals. The DK16 Base Key Service Unit can support a number of peripherals, which are not considered as stations and do not affect the maximum station and CO line capacities. A customer-supplied Music-on-hold source, customer-supplied separate background music source, customer-supplied reserve power batteries, a customer-supplied emergency standard telephone for system power failure occurrences and an amplifier with speaker for paging and night ringing can all be connected to the Base Key Service Unit (Table 3-D). A relay contact is also provided to control one of the following peripherals: Music-on-hold source, night bell, or Page Amplifier mute control.

2.30 The DK16 Expansion Key Service Unit

2.31 Station and CO Lines. The optional DK16 Expansion Key Service Unit has four universal slots which can support a maximum of four CO lines and eight stations. Printed circuit boards (PCBs) that support CO lines and can be installed in the Expansion Unit are the PCOU and KCDU (Table 3-E). PCBs that can support stations and be installed in the Expansion Unit are the PDKU, PEKU, PSTU, PESU, and KCDU.

2.32 Peripherals. The Expansion Unit can support either a PIOU or PIOUS PCB, which both provide, among other features, Station Message Detail Recording (SMDR), an interface for a local programming terminal, and connectors for an internal modem (IMDU) for remote maintenance and administration (Table 3-F). Any device that connects to the PIOU or PIOUS should not be considered a station and does not affect the system's station capacity.

TABLE 3-A
DK8 CO LINE/STATION CONFIGURATION GUIDE

EQUIPMENT

KSU = Key Service Unit ·2 CO Lines/4 digital circuits)
QCDU = Optional PCB (1 CO line/2 digital circuits)
QSTU = Optional PCB (2 standard circuits)
CO = Central Office
DKT = Digital Telephone
SLT = Standard Telephone

CONFIGURATION CO LINES BY STATION	COs	DKTs	SLTs	EQUIPMENT
2 by 4	2	4		KSU
2 by 6	2	4	2	KSU + QSTU
3 by 6	3	6		KSU + QCDU
3 by 8	3	6	2	KSU + QCDU + QSTU
4 by 8	4	8		KSU + QCDU + QCDU
4 by 10	4	8	2	KSU + QCDU + QCDU + QSTU

TABLE 3-B
DK16 CO LINE/STATION CONFIGURATION GUIDE (BASE AND EXPANSION UNIT)

EQUIPMENT

BU = Base Unit (4 CO lines/8 digital circuits)
KSTU = Base Unit Option (4 standard circuits)
EU = Expansion Unit
PDKU = EU option (8 digital circuits)
KCDU = EU option (2 CO lines/4 digital circuits)
PEKU = EU option (8 electronic circuits)
PESU = EU option (2 standard/4 electronic circuits)
PSTU = EU option (8 standard circuits)
PCOU = EU option (4 CO lines)
CO = Central Office line
DKT = Digital telephone
EKT = Electronic telephone
SLT = Standard telephone

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CONFIGURATION CO LINES BY STATION	COs	DKTs	EKTs	SLTs	EQUIPMENT
4 by 8	4	8			BU
4 by 12	4	8		4	BU + KSTU
4 by 14	4	8	4	2	BU + EU + PESU
4 by 16	4	8		8	BU + EU + PSTU
4 by 16	4	8	8		BU + EU + PEKU
4 by 16	4	16			BU + EU + PDKU
4 by 18	4	8	4	6	BU + KSTU + PESU
4 by 20	4	8	8	4	BU + KSTU + EU + PEKU
4 by 20	4	16		4	BU + KSTU + EU + PDKU
4 by 20	4	8		12	BU + KSTU + EU + PSTU
6 by 12	6	12			BU + EU + KCDU
6 by 16	6	12		4	BU + KSTU + EU + KCDU
8 by 8	8	8			BU + EU + PCOU
8 by 12	8	8		4	BU + KSTU + EU + PCOU
8 by 14	8	8	4	2	BU + EU + PCOU + PESU
8 by 16	8	8	8		BU + EU + PCOU + PEKU
8 by 16	8	16			BU + EU + PDKU + PCOU
8 by 16	8	16			BU + EU + KCDU + KCDU
8 by 18	8	8	4	6	BU + KSTU + EU + PCOU + PESU
8 by 20	8	16		4	BU + KSTU + EU + KCDU + KCDU
8 by 20	8	8	8	4	BU + KSTU + EU + PCOU + PEKU
8 by 20	8	16		4	BU + KSTU + EU + PCOU + PDKU
8 by 20	8	8		12	BU + KSTU + EU + PCOU + PSTU

TABLE 3-C
DK8 KEY SERVICE UNIT COMPONENTS

Item	Supports	Connector Type	Standard	Optional
Digital Telephone Circuits (4)	• Digital Telephones (with or without PDIU–DI2 or ADM) • Stand-alone Data Interface Units (PDIU-DS) • Door Phone Lock/Control Unit (DDCB)	25-pair Amphenol	✓	
CO Line Circuits (2)	• Loop Start CO Lines	RJ11 Modular	✓	
Power Failure Transfer Interface	• Standard Telephone (one)*	RJ11 Modular	✓	
Battery Backup Interface	• Optional HPFB Battery (one or two per system)	Proprietary Cable/Connector	Interface	HPFB with cable
Music-On-Hold/BGM Interface	• Music-on-hold/BGM Source*	RCA Jack	✓	
600 Ohm page Interface	• Amplifier/Speaker	RCA Jack	✓	
CO line CKT (1)/ Digital Telephone CKT (2) (QCDU) (max. 2 QCDU per system)	• Digital Telephones (with or without PDIU–DI2 or ADM) • Stand-alone Data Interface Units (PDIU-DS)	25-pair Amphenol		✓
	• Loop Start CO Line	RJ11 Modular		
Standard Telephone Interface Unit (QSTU) • 2 standard telephone circuits (1 max.) QSTU per system	• Standard Telephones* • Other Single-line Devices* • Fax Machine* • Voice Mail Devices • Alternate BGM source*	25-pair Amphenol		✓
DTMF/ABR Tone Receiver (3-Receiver CKT per QRCU)	• Automatic Busy Redial • Standard telephone ports • DISA	Internal		✓
Control Relay	One of the following: • Night Relay • External Page Mute • MOH Control Relay	25-pair Amphenol	✓	
Conference Circuit Interface Unit (QCNU)	• 2 Simultaneous Conferences	Internal	✓	
SMDR/TTY Interface Unit (QSMU) (Requires PPTC)	• SMDR Printer*, or • Maintenance Terminal* or • Modem*	6-pin Modular (PPTC adaptor)		✓

*****_Customer supplied equipment not offered by Toshiba Telecommunication Systems Division._

TABLE 3-D
DK16 BASE KEY SERVICE UNIT COMPONENTS

Item	Supports	Connector Type	Standard	Optional
Digital Telephone Circuits (8)	• Digital Telephones (with or without PDIU–DI2 or ADM) • Stand-alone Data Interface Units (PDIU-DS) • Door Phone Lock/Control Unit (DDCB) • Digital Direct Station Selection Console (DDSS)	25-pair Amphenol	✓	
CO Line Circuits (4)	Loop Start CO Lines	RJ11 Modular	✓	
Power Failure Transfer Interface	Standard Telephone (one)*	RJ11 Modular	✓	
Battery Backup Interface with built-in charger	Two 12-volt Batteries*	Proprietary Connector/Cable	✓	Cable and Batteries
Music-On-Hold/BGM Interface	Music-on-Hold/BGM source*	RCA Jack	✓	
600 Ohm page Interface	Amplifier/Speaker	RCA Jack	✓	
Standard Telephone* Interface Unit (4-Circuit) (KSTU)	• Standard Telephones* • Other Single-line Devices* • Alternate BGM Source* • Fax machine* • Voice mail devices	25-pair Amphenol		✓
DTMF/ABR Receiver (K4RCU)	• Automatic Busy Redial • Standard Telephone Ports • Interprets DTMF Tones • DISA	Internal		✓
Feature Cartridge	• Future Feature Upgrades	Internal		✓
Control Relay	Choice of one: • MOH Source Control • Night Bell Control • BGM Mute Control	25-pair Amphenol	✓	

**Customer supplied equipment not offered by Toshiba Telecommunication Systems Division.*

TABLE 3-E
DK16 EXPANSION KEY SERVICE UNIT PCBs

PCB	Circuits per PCB	Interfaces	Connector
PDKU	8 digital telephone circuits	• Digital telephones with or without PDIU-DI2 or ADM • DDSS console • PDIU-DSs • DDCB	25-pair amphenol
PEKU	8 electronic telephone circuits	• Electronic telephones • HDSS console • BGM source • EOCU PCB for OCA	25-pair amphenol
PSTU	8 standard telephone circuits	• Standard telephones • Voice mail ports • Background music source • Off-premises stations • Other similar devices	25-pair amphenol
PESU	2 standard telephone/ 4 electronic telephone circuits (standard/electronic telephone ports)	Standard: same as PSTU Electronic: same as PEKU except PESU does not support HDSS console	25-pair amphenol
PCOU	4 CO line circuits (lines)	• Central Office loop start lines	RJ14C modular
KCDU	2 CO line circuits/ 4 digital telephone circuits	• Central Office loop start lines • DKT circuits same as PDKU, except no DDSS	RJ14C Modular (CO Line circuits) 25-pair amphenol (digital telephone circuits)
PIOU, PIOUS	See Table 3-D	See Table 3-D	25-pair amphenol (PIOU) Spring clip terminal (PIOUS)

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3 STATION CONSIDERATIONS

3.00 For configuration purposes, a station can be considered as any device which is connected to a dedicated telephone circuit. Although the words "telephone" and "station" are often used synonymously and interchangeably in STRATA DK8/ DK16 documentation, devices other than telephones—such as Stand-alone Data Interface units (PDIU-DSs)—should also be considered as stations when configuring a system, because they require a dedicated telephone circuit. A station apparatus overview is shown in Table 3-G (for STRATA DK8) and Table 3-H (for STRATA DK16).

3.10 Telephone Circuit (Port) Types

3.11 There are three types of telephone circuits to which stations can be connected: digital telephone circuits, electronic telephone circuits, and standard telephone circuits. All three types of circuits are available with the STRATA DK16. The STRATA DK8 does not support electronic telephone circuits.

3.20 Digital Telephone Circuit Connections

3.21 The STRATA DK8 Key Service Unit provides four digital telephone circuits. The QCDU PCB provides two.

TABLE 3-F
PIOU/PIOUS INTERFACE OPTION (DK16 ONLY)

Expansion Unit Interface Options	PIOU	PIOUS
Zone Page Interface (unamplified, 4 zones)	X	
Night Transfer or Music-on-Hold Control Relay	X	X
Door Lock or External Amplifier Control Relay	X	X
Alarm Sensor	X	X
SMDR output (RS-232/6-wire modular connector)	X	X
Maintenance Port for a Local ASCII Terminal or External Modem (RS-232/6-wire modular connector)	X	X
Remote Maintenance Modem (IMDU subassembly, no external connector)	X	X

NOTE: X = the option is provided

TABLE 3-G
STRATA DK8 STATION APPARATUS OVERVIEW

Station	Type and Number of Circuits Required	PCB or Interface	KSU Capacity	KSU and Optional PCB Combined Capacity
Digital Telephone DKT with or without ADM or PDIUDI	Digital, one for each DKT	KSU (Circuits 1 ~ 4) QCDU (Circuits 1 ~ 2)	4	8
Stand-alone Data Interface Unit (PDIU-DS)	Digital, one for each PDIU-DS	KSU (Circiuts 1 ~ 4) QCDU (Circuits 1 ~ 2)	4	8
Digital Door Phone/Lock Control Unit (DDCB)	Digital, one for each DDCB	KSU Port 02 Port 03	2	2
Single-wire pair devices: • Standard Telephone • Voice Mail Device • Facsimile Machine • Modem • Dictation Equipment	Standard, one for each device (voice mail devices may require more than one circuit)	QSTU (Circuits 1 ~ 2)	—	2
Alternate Background Music Source*	Standard port for the source	QSTU (Circuit 2) Port 19	1	1

**May require interface transformer, see Section 100-816-207.*

TABLE 3-H
STRATA DK16 STATION APPARATUS OVERVIEW

Station	Type and Number of Circuits Required	PCB or Interface	Base Unit Capacity	Base and Expansion Unit Combined Capacity
Digital Telephone (DKT with or without ADM or PDIU-DI)	Digital, one for each DKT	Base Unit (Circuits 1~8) PDKU2 (Circuits 1~8) KCDU (Circuits 1~4)	8	16
Stand-alone Data Interface Unit (PDIU-DS)	Digital, one for each PDIU-DS	Base Unit (Circuits 1~8) PDKU2 (Circuits 1~8) KCDU (Circuits 1~4)	8	16
Digital Direct Station Selection Console (DDSS)	Digital, one for each DDSS	Base Unit (Circuit 8) PDKU (Circuit 8)	1	2
Digital Door Phone/Lock Control Unit (DDCB)	Digital, one for each DDCB	Base Unit (Circuit 5) PDKU (Circuit 1) or first KCDU (Circuit 1)	1	2
Electronic Telephone (EKT)	Electronic, one for each EKT	PEKU (Circuits 1~8) PESU (Circuit 5~8)	0	8
Electronic Direct Station Selection Console (HDSS)	Electronic, two for the HDSS	PEKU (Circuits 7 and 8)	0	1
Conference Amplifier	Electronic, two for the amplifier	PEKU (Circuits 6 and 7) PESU (Circuits 6 and 7)	0	1
Single-wire-pair Devices: • Standard Telephone • Voice Mail Device • Facsimile Machine • Modem • Dictation Equipment	Standard, one for each device (voice mail devices may require more than one circuit)	KSTU (Circuits 1~4) PSTU (Circuits 1~8) PESU (Circuits 1~2)	4	12
Alternate Background Music Source	Standard or Electronic, one for the source	KSTU (Circuit 4) PEKU (Circuit 3) PESU (Circuit 8) PSTU (Circuit 4)	1	1

**May require interface transformer, see Section 100-816-207.*

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NOTE:
A maximum of two QCDU PCBs may be installed in the STRATA DK8.

3.22 The STRATA DK16 Base Key Service Unit and the PDKU PCB each provide eight digital telephone circuits. The KCDU PCB provides four.

NOTE:
A maximum of two KCDU PCBs may be installed in the STRATA DK16. If a KCDU is installed, no other type of station PCB can be installed in the STRATA DK16.

3.23 The following devices can be connected to digital telephone circuits:

- **Digital Telephones (2000- and 1000-series):** Each digital telephone requires one circuit, and each digital telephone circuit can support a digital telephone.
- **Stand-alone Data Interface Units (PDIU-DS)**: Each PDIU-DS requires one circuit. Any digital telephone circuit, except for Circuit 8 on a PDKU1 (STRATA DK16), can support a PDIU-DS (see Note 1).

  NOTES:
  1. *There are two versions of the PDKU: PDKU1 and PDKU2. The versions are identical, except that Circuits 1 ~ 8 on the PDKU2 can each support PDIU-DSs/ PDIU-DI, while only Circuits 1 ~ 7 on a PDKU1 can support PDIU-DSs or PDIU-DIs. Also, PDIU1 does not support 2000-series digital telephone continuous DTMF tones.*
  2. *The Integrated Data Interface Unit (PDIU-DI/PDIU-DI2) and the Add-on Module (ADM) do not require a dedicated circuit. They share a circuit with the telephone.*
  3. *Only one option (PDIU-DI2 or ADM) can be installed on a 2000-series digital telephone.*

- **Digital Direct Station Selection Console (DDSS)**: (available with STRATA DK16 only) Each DDSS Console requires one circuit. DDSS Consoles can connect only to Circuit 8 in the Base Key Service Unit and Circuit 8 on a PDKU. The KCDU cannot support a DDSS console.
- **Digital Door Phone/Lock Control Box (DDCB):** Each DDCB requires one circuit. DDCBs can only connect to Circuits 3 and 4 (Ports 02 and 03) in the STRATA DK8 Key Service Unit or Circuit 5 (Port 04) in the STRATA DK16 Base Key Service Unit, and Circuit 1 (Port 12) on either the PDKU or KCDU (STRATA DK16).

3.30 Electronic Telephone Circuit Connections (STRATA DK16 Only)

3.31 There are no electronic telephone circuits in the Base Key Service Unit, and none can be added to it. However, either the PEKU PCB, which has eight electronic telephone circuits, or the PESU, which has four electronic telephone circuits, can be installed in the Expansion Key Service Unit. The following devices can be connected to electronic telephone circuits.

- **Electronic Telephones (6500-, 6000-, 3000-, 2000-series)**: An electronic telephone can be connected to any electronic telephone circuit. One electronic telephone circuit is required per electronic telephone.
- **Electronic Direct Station Selection Console (HDSS):** The system will support only one HDSS console. The console must be connected to both Circuits 7 and 8 on the PEKU. The PESU will not support an HDSS Console.
- **Alternate Background Music Source:** The system will support an alternate Background Music source which can be heard over digital and electronic telephone speakers and external page speakers. This source can be connected to either Circuit 3 on a PEKU, Circuit 8 on a PESU, or Circuit 4 on a KSTU or PSTU PCB.
- **Conference Amplifier:** An amplifier for two CO line conferencing can be connected to Circuits 6 and 7 (Ports 17 and 18) on a PEKU or PESU.

3.40 Standard Telephone Circuit Options

3.41 In addition to supporting standard telephones, each of the standard telephone circuits can support any one of a number of single-wire-pair devices, including voice mail/Auto Attendant devices and modems. The QSTU, which can be installed in the STRATA DK8 Key Service Unit, has two

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standard telephone circuits. The KSTU, which can be installed in the STRATA DK16 Base Key Service Unit, has four standard telephone circuits; the PSTU, which can be installed in the DK16 Expansion Key Service Unit, has eight; and the PESU, which can also be installed in the DK16 Expansion Unit, has two (Circuits 1 and 2).

4 TELEPHONE UPGRADES

4.00 Digital and Electronic telephones can be upgraded for a number of features; there are no upgrades for standard telephones. Each of these upgrades shares a circuit with the telephone that it is connected to and is not considered a station.

4.10 Digital Telephone Upgrades

4.11 Digital telephones can be upgraded with the following subassemblies:

- **Integrated Data Interface Unit (PDIU-DI/PDIU-DI2):** A Digital telephone can be upgraded with a PDIU-DI/PDIU-DI2 to provide the telephone with data switching capabilities. 2000-series Digital Telephones use the PDIU-DI2, and 1000-series Digital Telephones use the PDIU-DI. PDIU-DI2 cannot be installed on a telephone if ADM is installed.
- **Add-on Module (ADM):** A 2000-series Digital Telephone can be upgraded with an ADM to provide 20 Direct Station Selection buttons on STRATA DK16, or 10 DSS buttons, 8 speed dial buttons, one night transfer button and one all call page button on STRATA DK8. The 1000-series Digital Telephone models cannot support ADMs. ADM cannot be installed on a telephone if PDIU-DI2 is installed.
- **Off-hook Call Announce Upgrade (DVSU):** A Digital telephone that must receive Off-hook Call Announce must be upgraded with a DVSU.
- **Loud Ringing Bell/Headset Upgrade (HHEU)**: A digital telephone can be upgraded with an HHEU to provide a dual interface for the Loud Ringing Bell feature and/or a headset. (Simultaneously with PDIU-DI2 or ADM).

4.20 Electronic Telephone Upgrades

4.21 On STRATA DK16, electronic telephones can be upgraded with the following subassemblies:

- **Off-hook Call Announce Upgrade (HVSU2 or HVSU/HVSI):** An electronic telephone must be upgraded with the HVSU2 subassembly or the combined HVSU/HVSI subassemblies to receive Off-hook Call Announce.

  NOTE:
  A PEKU or PESU PCB that supports electronic telephones that must receive Off-hook Call Announce must be equipped with an EOCU.

- **Loud Ringing Bell/Headset Upgrade (HHEU)**: An electronic telephone can be upgraded with an HHEU to provide a dual interface for the Loud Ringing Bell feature and a headset simultaneously.

5 CONFIGURATION EXAMPLES

5.00 The following provides an examples of how to configure a STRATA DK8.

5.10 Strata DK8 - Example 1 (Smalll Retail Store)

5.11 Customer Requirements. A store needs two CO lines and four digital telephones.

5.12 Analysis. The store's system hardware requirements are as follows:

- Two CO line circuits for the CO lines.
- Four digital telephone circuits for the digital telephones.

5.13 Conclusion. A standard Key Service Unit would be adequate in this case. The unit's standard four digital telephone circuits and two CO line circuits could easily accommodate the store's needs and allow for future expansion.

5.20 Strata DK8 - Example 2 (Home/Office)

5.21 Customer Requirements. In addition to three CO lines, a home/office needs five digital telephones (three of which will have PDIU-DIs), a modem, a door phone, one facsimilie machine, Music-on-hold and Telephone Set Background Music.

5.22 Analysis. The customer's requirements could be broken down as follows:

- 3 CO line circuits for the three CO lines
- 7 digital telephone circuits
  - one for each of the five digital telephones; the PDIU-DIs do not require dedicated circuits.
  - one for a digital door phone/lock control unit to support a door phone
  - one for the PDIU-DS connected to the modem
- 2 standard telephone circuits
  - one for the modem
  - one for the facsimilie machine
- A music source for Music-on-hold and Background music can be connected to the Key Service Unit MOH RCA jacks.

5.23 Conclusion. Several optional PCBs in addition to the Key Service unit would be needed for the application. Two CO line circuits and four digital telephone circuits would be provided by the KSU. The third CO line circuit, as well as two digital telephone circuits would be provided by an optional QCDU. A second QCDU would be necessary to provide the seventh digital telephone circuit. An optional QSTU would provide the two standard telephone circuits. An optional QRCU would be needed for the Dual-tone Multi-frequency (DTMF) tones generated by the devices (modem and facsimilie machine) connected to the standard telephone lines.

5.30 The following provides an examples of how to configure a STRATA DK16.

5.40 Strata DK16 - Example 1 (Bank)

5.41 Customer Requirements. A bank needs two CO lines and six digital telephones (three of which must be equipped with a PDIU-DI). It also wants to connect a printer to a PDIU-DS.

5.42 Analysis. The bank's system hardware requirements are as follows:

- Two CO line circuits for the two CO lines.
- Seven digital telephone circuits. Six for telephones and one for the PDIU-DS. (The PDIU-DIs do not require a dedicated circuit.)

5.43 Conclusion. A standard Base Key Service Unit would be adequate in this case. The unit's standard eight digital telephone circuits and four CO line circuits could easily accommodate the bank's needs.

5.50 Strata DK16 - Example 2 (Office/Warehouse)

5.51 Customer Requirements. In addition to five CO lines, a small office-warehouse facility needs 11 digital telephones (three of which will have PDIU-DIs), two PDIU-DSs, a modem, a facsimile machine, conference capability, a door phone, one standard telephone, Music-on-hold, and an amplifier/speaker for paging.

5.52 Analysis. The customer's requirements could be broken down as follows:

- 14 digital telephone circuits
  - one for each of the 11 digital telephones; the PDIU-DIs do not require dedicated circuits.
  - one for each of the two PDIU-DSs
  - one for a digital door phone/lock control unit to support a door phone
- 3 standard telephone circuits
  - one for the modem
  - one for the facsimile machine
  - one for the standard telephone
- A music source for Music-on-hold and an amplifier/speaker for paging could both be connected to the Key Service Unit RCA jacks.
- A K4RCU would be needed for the Dual-tone Multi-frequency (DTMF) tones generated by the devices connected to the standard telephone circuits.
- A PCOU would be needed for the fifth CO line.

5.53 Conclusion. An Expansion Key Service Unit in addition to the Base Key Service Unit would be needed for this application. The three standard telephone circuits could be contained on the optional KSTU PCB in the Base Unit. However, a PDKU installed in the Expansion Unit would be required for six of the 14 digital telephone circuits. The Expansion Unit would also be needed for the PCOU. The optional K4RCU, along with the music source and the page/amplifier, as noted earlier, could be connected to the Base Unit.

6 CONFIGURATION WORKSHEETS

6.00 Worksheets are provided in this chapter to help configure the system.

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DK8 WORKSHEET 1, STATION AND CO LINE TOTALS

1. DIGITAL PORTS (CIRCUITS)

Device	Quantity	x	Ports/Per	=	Ports Used
DDCBs (2 max.)	_____	X	1	=	___________
PDIU-DSs (8 max.)	_____	X	1	=	___________
Digital Telephones (with or without PDIU-DIs or ADMs) (8 max.)	_____	X	1	=	___________
		Total Digital Ports (8 max.)		=	___________

2. STANDARD PORTS (CIRCUITS)

Device	Quantity	x	Ports/Per	=	Ports Used
Maximum of 2 items total, including Standard Telephones:					
Standard Telephones	_____	X	1	=	___________
or Other Devices: –Voice Mail –Auto Attendant –BGM Source –Fax –Modem	_____	X	1	=	___________
		Total Standard Ports (2 maximum)		=	___________

3. CO LINES

Number of CO lines required? _______
(Maximum of 4)

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DK8 WORKSHEET 2, KEY SERVICE UNIT AND PCBs

1. From Worksheet 1 enter the number of required ports (circuits) and lines.

Digital Ports:	_____	(8 max)
Standard Ports:	_____	(2 max)
CO Lines:	_____	(4 max)

NOTE: The maximum number of digital ports is 8, and standard ports is 2. The maximum number of CO lines is four.

2. Cross off the printed circuit boards (PCBs)—in addition to the standard Base Key Service Unit lines and ports— needed to support the ports and lines entered in Step 1 of this worksheet.

KSU Interfaces (built-in)

2 CO lines, 4 digital ports

KSU Optional Unit Station and Line PCBs

QCDU (1 CO line and 2 digital ports):	_____	two max.
QSTU (2 standard ports):	_____	one max.

3. Refer to Worksheet 3 to determine option and peripheral requirements.

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DK8 WORKSHEET 3, PERIPHERALS AND UPGRADES

1. BASE UNIT PERIPHERALS

Battery Backup Interface: Yes or No _____
One or two HPFB batteries can be connected to a backup battery interface (Standard on DK8) to provide backup battery backup if there is a power failure. (Connecting cable is included. 1-HPFB for .5 ~ 1 hour backup; 2-HPFBs for 1.5 ~ 2 hours backup.)

QRCU: Yes or No _____
The QRCU is required to interpret Dual-tone Multi-frequency (DTMF) tones from standard telephones, Voice Mail, Auto Attendant, and DISA CO circuits, or if the Auto Busy Redial (ABR) feature is required.

Music-on-hold/Background Music Source Interface: Yes or No _____
A music source can be connected to this interface (Standard on DK8) to provide Music-on-hold to CO lines and stations on hold, and to provide Background Music to station speakers and external page speakers.

Power Failure Transfer Interface: Yes or No _____
A standard telephone can be connected to this interface to provide connection to a CO line if there is a power failure. PFT interface is standard on DK8; one customer-supplied standard telephone is required.

600 ohm page Interface (Standard on DK8): Yes or No _____
This interface connects with customer-supplied speakers and amplifiers for paging (or Toshiba HESB) and Background Music applications.

QSMU: Yes or No _____
A customer-supplied Station Message Detail Recording (SMDR) printer, or Remote Maintenance Terminal (TTY) or modem.

PPTC: Yes or No _____
Modular adaptor required for interface to SMDR device or Maintenance Terminal or Modem.

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2. TELEPHONE UPGRADES (All upgrades share the telephone port and do not require separate ports.)

Add-on Module (ADM): Total _____
2000-series digital telephones can be equipped with an Add-on Module to provide 10 Direct Station Selection buttons, autodial buttons, all call page, and night transfer (if PDIU-DI2 is installed, ADM cannot be installed).

DVSU: Total _____
One DVSU is required for each digital telephone that must receive Off-hook Call Announce.

HESC-65A: Total _____
One HESC-65A modular connecting cable is required to connect the HESB to the HHEU in each telephone requiring the Loud Ringing Bell feature. See HHEU and HESB.

HHEU: Total _____

One HHEU must be installed in each digital telephone that supports a headset or connects to an HESB for the Loud Ringing Bell feature. See HESC-65A.

PDIU-DI2: Total_____ for 2000-series Digital Telephones;
(If ADM is installed, PDIU-DI2 cannot be installed).
PDIU-D1: Total_____ for 1000-series Digital Telephones
Digital telephones must be equipped with a PDIU-DI2 or a PDIU-DI to transmit and receive voice and data calls.

DK8 WORKSHEET 3, PERIPHERALS AND UPGRADES (continued)

Miscellaneous Peripherals

HESB (Amplifier/Speaker): Total _____

1. One HESB and HHEU is required for each digital telephone with the Loud Ringing Bell feature.
2. One HESB is optional to provide single-zone external page connected to the KSU's 600 ohm external page output. (Customer-supplied amplifiers/speakers may be used in place of the HESB.)
3. One HESB is optional to provide a talkback amplifier/page speaker connected to the KSU's 600 ohm external page output. (Customer-supplied amplifiers/speakers may be used in place of the HESB.) Talkback requires MDFB also.

DDCB/MDFB (Door Phone): Total DDCBs _____ Total MDFBs _____

The MDFB plugs into the DDCB to provide a door phone. Each DDCB can support up to three MDFBs; a maximum of two DDCBs and 6 MDFBs can be connected to the system. Each DDCB requires a digital telephone circuit. The MDFB may also be connected to the HESB amplifier/speaker to provide page talkback.

NOTE:
Worksheet 4, System Power Check, is not required for DK8. The DK8 power supply will support any DK8 maximum configuration.

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DK16 WORKSHEET 1, STATION AND CO LINE TOTALS

1. DIGITAL PORTS (CIRCUITS)

Device	Quantity	x	Ports/Per	=	Ports Used
DDSS Consoles (2 max.)	______	X	1	=	__________
DDCBs (2 max.)	______	X	1	=	__________
PDIU-DSs (16 max.)	______	X	1	=	__________
Digital Telephones (with or without PDIU-DIs or ADMs) (16 max.	______	X	1	=	__________
		Total Digital Ports (16 max.)		=	__________

2. ELECTRONIC PORTS (CIRCUITS)

Device	Quantity	x	Ports/Per	=	Ports Used
HDSS Console (1 max.)	______	X	2	=	__________
Alternate BGM Source (1 max.)	______	X	1	=	__________
Conference Amplifier (1 max.)	______	X	2	=	__________
Electronic Telephones (8 max.)	______	X	1	=	__________
		Total Electronic Ports (8 max.)		=	__________

3. STANDARD PORTS (CIRCUITS)

Device	Quantity	x	Ports/Per	=	Ports Used
Maximum of 12 items total, including Standard Telephones:					
Standard Telephones	______	X	1	=	__________
or					
Other Devices:					
–Voice Mail	______	X	1	=	__________
–Auto Attendant	______	X	1	=	__________
–Fax	______	X	1	=	__________
–Modem	______	X	1	=	__________
–Alternate Background Music (BGM) Source	______	X	1	=	__________
		Total Standard Ports (12 maximum)		=	__________

4. CO LINES

Number of CO lines required? ________
(8 maximum)

DK16 WORKSHEET 2, KEY SERVICE UNIT AND PCBs

1. From Worksheet 1 enter the number of required ports (circuits) and lines.

Digital Ports:	_____
Electronic Ports:	_____
Standard Ports:	_____
CO Lines:	_____

NOTE: The maximum number of combined digital, electronic, and standard ports is 20. The maximum number of CO lines is eight.

2. Cross off the printed circuit boards (PCBs)—in addition to the standard Base Key Service Unit lines and ports— needed to support the ports and lines entered in Step 1 of this worksheet.

Base Unit Interfaces/PCBs

Base Unit (4 CO lines, 8 digital ports):	X	built-in	
KSTU (4 standard ports):	_____	one max.	

Expansion Unit Station and line PCBs

KCDU (2 CO lines and 4 digital ports):	_____	two max.	(KCDU cannot be installed with any other type of station PCB or PCOU PCB)
- or -			
PDKU (8 digital ports):	_____	one max.	
- or -			
PEKU (8 electronic ports):	_____	one max.	
- or -			
PSTU (8 standard ports):	_____	one max.	
- or -			
PESU (2 standard ports and (4 electronic ports):	_____	one max.	
PCOU (4 CO lines):	_____	one max.	(PCOU can be installed with PDKU, PEKU, PESU, or PSTU, but not with KCDU)

NOTES:
1. *The Base Unit by can only support up to 12 stations (8 digital and 4 standard) and four CO lines.*
2. *The Expansion Unit can support up to eight stations and four CO lines.*
3. *If installing two DDCBs, a PDKU or a KCDU is required to support the second DDCB—no matter what the total number of digital ports.*
4. *If installing two DDSS Consoles, a PDKU is required to support the second DDSS Console—no matter the total number of digital ports. (KCDU does not support DDSS.)*

3. Refer to Worksheet 3 to determine option and peripheral requirements.

4. Refer to Worksheet 4 to determine the amount of power used by the system.

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DK16 WORKSHEET 3, PERIPHERALS AND UPGRADES

1. BASE UNIT PERIPHERALS

Battery Backup Interface: Yes or No _____
Two 12-volt customer-supplied batteries can be connected to this interface to provide backup battery backup if there is a power failure. See PBTC-3M.

K4RCU: Yes or No _____
The K4RCU is required to interpret Dual-tone Multi-frequency (DTMF) tones from standard telephones, Voice Mail, Auto Attendant, and DISA CO circuits.

Music-on-hold/Background Music Source Interface: Yes or No _____
A music source can be connected to this interface (Standard on DK16) to provide Music-on-hold to CO lines and stations on hold, and to provide Background Music to station speakers and external page speakers.

Alternate Background Music Source: Yes or No _____ (see **Worksheet 1)**

Power Failure Transfer Interface: Yes or No _____
A standard telephone can be connected to this interface to provide connection to a CO line if there is a power failure. PFT interface is standard on DK16; one customer-supplied standard telephone is required.

PBTC-3M: Yes or No _____
One PBTC-3M cable is required for each system that requires battery backup. See Battery Backup Interface.

600 ohm page interface (Standard on DK16): Yes or No _____
This interface connects with customer-supplied speakers and amplifiers (or Toshiba HESB) for paging and Background Music applications.

Night Bell: Yes or No _____
A customer supplied night ringing bell can be installed and controlled by the Base Unit relay control (Standard on DK16).

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2. EXPANSION UNIT PERIPHERAL PCB

PIOU or PIOUS: If yes, which one _____
See Table 3-D.

PPTC: One or Two _____
Modular adaptor, required for PIOU/PIOUS interface to SMDR device or local maintenance terminal.

3. TELEPHONE UPGRADES (All upgrades share the telephone port and do not require separate ports.)

Add-on Module: Total _____
2000-series digital telephones can be equipped with an Add-on Module to provide 20 Direct Station Selection buttons. (If PDIU-DI2 is installed, Add-on Module cannot be installed.)

DVSU: Total _____
One DVSU is required for each digital telephone that must receive Off-hook Call Announce.

HESC-65A: Total _____
One HESC-65A modular connecting cable is required to connect the HESB to the HHEU in each telephone requiring the Loud Ringing Bell feature. See HHEU and HESB.

DK16 WORKSHEET 3, PERIPHERALS AND UPGRADES (continued)

HHEU: Total _____
One HHEU must be installed in each digital and electronic telephone that supports a headset or connects to an HESB for the Loud Ringing Bell feature. See HESC-65A.

HVSU2 or Combined HVSU/HVSI: Total _____
Electronic telephones must be equipped with either the HVSU2 assembly or the combined HVSU and HVSIs assemblies to receive Off-hook Call Announce. See EOCU under Miscellaneous Peripherals.

PDIU-DI2: Total_____ for 2000-series Digital Telephones;
PDIU-D1: Total_____ for 1000-series Digital Telephones
Digital telephones must be equipped with a PDIU-DI2 or a PDIU-DI to transmit and receive voice and data calls. (If Add-on module is installed, then PDIU-DI2 cannot be installed.)

Miscellaneous Peripherals

DPFT: Yes or No_____
The DPFT provides a means to connect eight selected CO lines to standard telephones if there is a power failure. (PSTU must be installed in Expansion Unit)

EOCU: Yes or No _____
An EOCU must be installed on a PEKU or PESU that is connected to electronic telephones which are equipped to receive Off-hook Call Announce. See HVSU2 and HVSU/HVSI in Telephone Upgrades.

HESB (Amplifier/Speaker): Total _____
1. One HESB and HHEU is required for each digital and electronic telephone with the Loud Ringing Bell feature.
2. One HESB is optional to provide single-zone external page connected to the Base Unit's 600 ohm external page output. (Customer-supplied amplifiers/speakers may be used in place of the HESB.)
3. One HESB is optional to provide a talkback amplifier/page speaker connected to the Base Unit's 600 ohm external page output. (Customer-supplied amplifiers/speakers may be used in place of the HESB.) Talkback for HESB requires an MDFB.

MDFB (Door Phone): Total _____
The MDFB plugs into the DDCB to provide a door phone. Each DDCB can support up to three MDFBs; a maximum of two DDCBs can be connected to the system. Each DDCB requires a Digital Telephone circuit. The MDFB may also be connected to the HESB amplifier/speaker to provide page talkback.

DK16 WORKSHEET 4, SYSTEM POWER CHECK

Total Power Used:

Equipment Type:	Equipment Quantity	X	Power Used (Factor)	=	Ports Used
2000- and 1000-series digital telephone	________	X	(1.0)	=	________.
2000-series electronic telephone	________	X	(2.0)	=	________.
3000-series electronic telephone	________	X	(2.5)	=	________.
6000-series electronic telephone	________	X	(2.0)	=	________.
6005-series electronic telephone	________	X	(2.0)	=	________.
6500-series electronic telephone	________	X	(1.0)	=	________.
DDSS/HDSS console*	________	X	(0.8)	=	________.
PDIU-DI2 and PDIU-DI	________	X	(0.5)	=	________.
PDIU-DS	________	X	(0.8)	=	________.
Standard telephone	________	X	(1.0)	=	________.
Add-on Module	________	X	(0.4)	=	________.
			Total Power Used		

* All series.

Power Criteria:

Power Supplied — **Total Power Used:** Must be greater than zero.

Configuration Power Check: 24.8 — ________ = ________

Power Supplied (24.8)
Total Power Used
Must be Greater than Zero

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Strata® DK8

INSTALLATION

CHAPTER FOUR
DK8 KSU AND PCB INSTALLATION

H

TABLE OF CONTENTS

H

TABLE OF CONTENTS (CONTINUED)

FIGURE LIST

H

PART I. KSU INSTALLATION

1 GENERAL

1.00 This chapter provides the instructions necessary to mount the STRATA DK8 Key Service Unit. Instructions are also provided on how to remove and replace the power supply.

2 KEY SERVICE UNIT MOUNTING

2.00 Mounting Surface Considerations

2.01 The Key Service Unit (KSU) is designed to be mounted on a wall or other vertical surface. It is recommended to use the method shown in Figure 4-1 (see Note). See Figure 4-2 for DK8 KSU physical dimensions.

> *NOTE:*
> *Install screws first to the hard board, and then secure the hard board to the wall, making certain that screws are aligned with studs.*

2.10 Mounting Preparation

1) Loosen the screws on the front cover of the Key Service Unit, and remove the cover (Figure 4-2).

2) Move the **SW1** RAM Storage Battery jumper plug strap on the motherboard to the ON position (Figure 4-5).

3) If the DK8 is less than one mile from the central office (or PBX), set the CO line PAD switches, SW101 and SW201, to the PAD position to provide a 3db level loss to avoid excessive loudness.

4) Install all optional PCBs per Paragraph 5.

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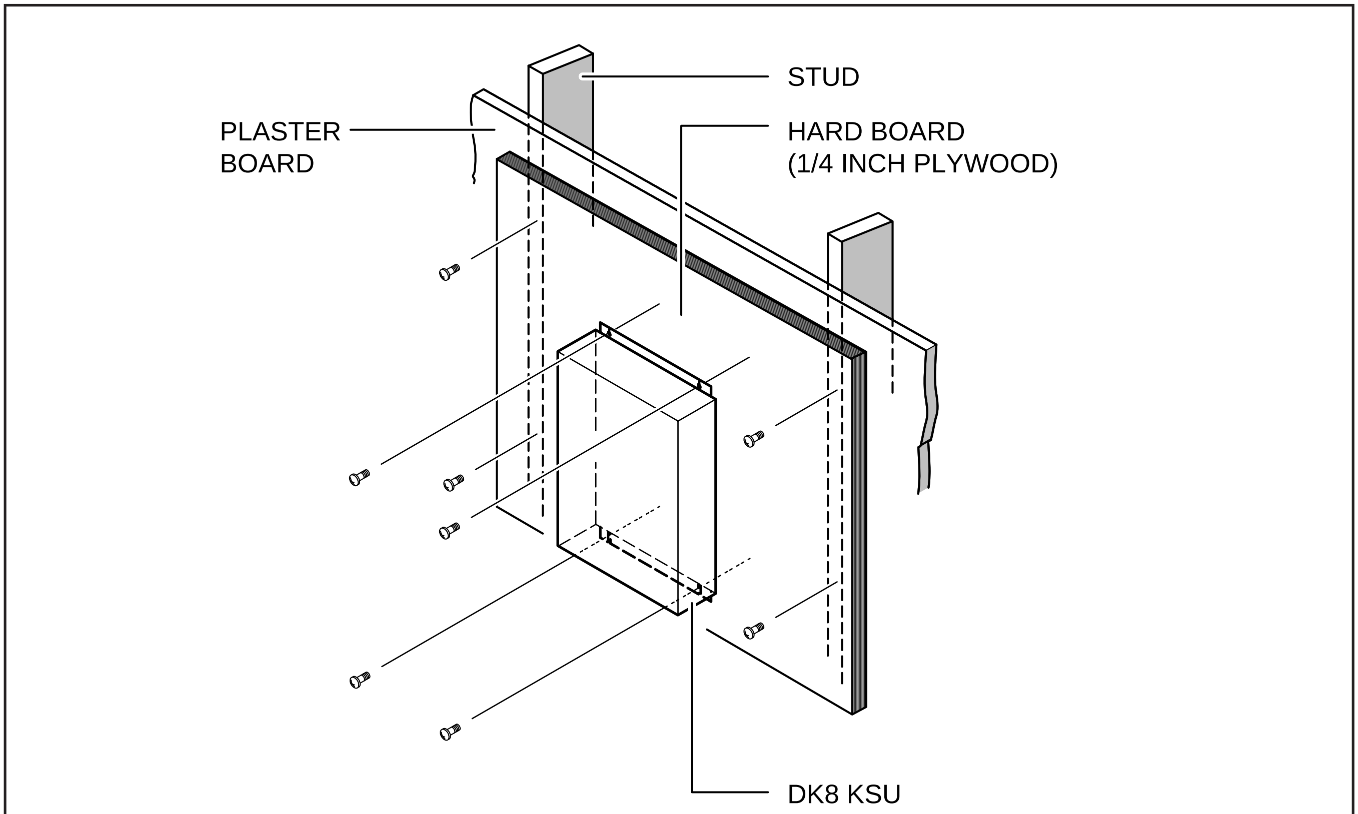


FIGURE 4-1
DK8 KEY SERVICE UNIT WALL MOUNT METHOD

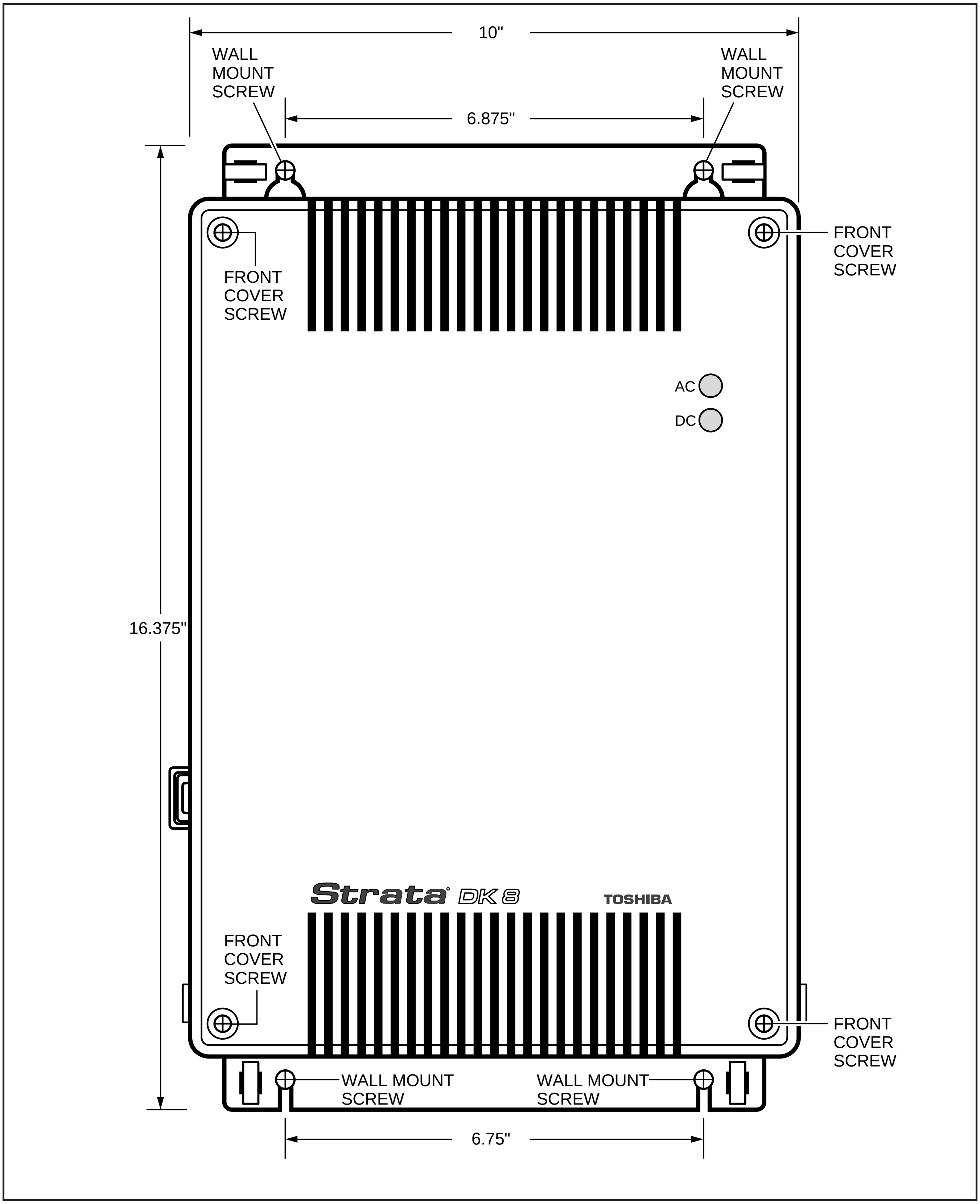


FIGURE 4-2
DK8 DIMENSIONS AND SCREW LOCATIONS

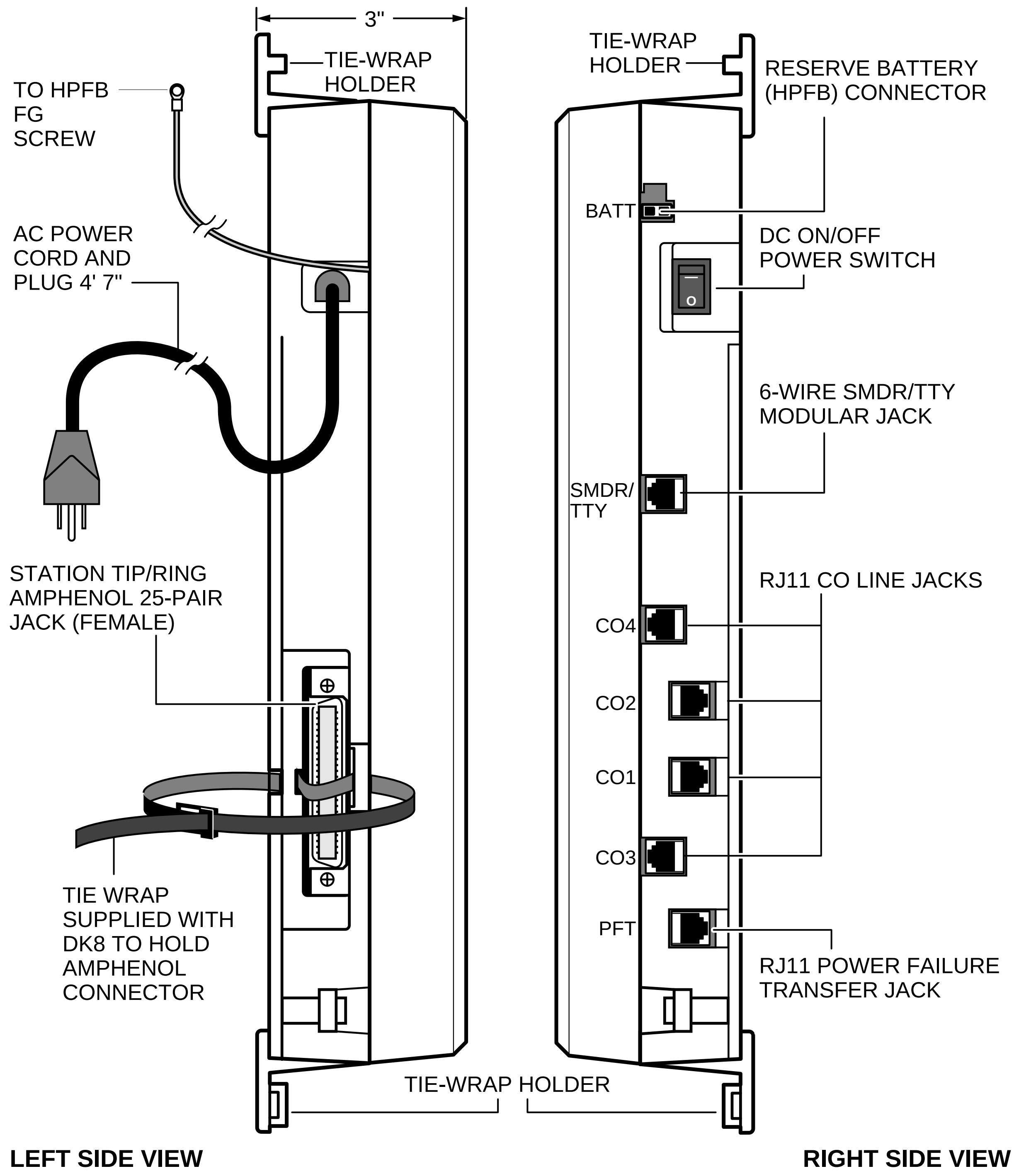


FIGURE 4-3
DK8 SIDE VIEW DIMENSION AND PLUG/JACK LOCATIONS

2.20 Mounting the Key Service Unit

1) Make sure the power supply switch is turned OFF.

2) Place the Key Service Unit on the desired location on the mounting surface and mark the location of the four screw holes (there is one on each corner). See Figures 4-1 and 4-2.

NOTE:
Make sure the location of the Key Service Unit meets the minimum clearance requirements specified in Figure 2-1 in Chapter 2.

3) Drill holes on these marks.

4) Secure screws approximately two thirds of the way into the top two holes on the mounting surface.

5) Hang the unit from the top two screws and then secure the screws completely into the mounting surface.

6) Finish securing the unit to the mounting surface by completely screwing the bottom two screws into the wall.

7) Ground system according to Chapter 2, Paragraph 4.

8) Connect applicable wiring (modular CO line cords, 25-pair amphenol connector cable, etc.) to the Key Service Unit. Route the wiring as shown in Figure 4-4, and then fasten wiring to the unit with the tie wraps that come with the Key Service Unit. (See Section 100-816-208, for additional wiring information.)

NOTE:
Figure 4-4 shows cables routed to the right; they may also be routed to the left, depending on the location of the MDF.

9) If the Reserve Power Battery and Charger (HPFB) is going to be installed, refer now to Paragraph **2.30**. If not, proceed to Step 10.

10) Plug the AC power cable into an outlet and then turn ON the DC power supply switch.

11) Reinstall the front cover onto the Key Service Unit.

2.30 Installing the Reserve Power Battery and Charger (HPFB) (Figure 4-4)

1) Place the HPFU directly above the DK8 KSU.

2) Mark the location of the two screw holes, then drill holes.

3) Screw the two screws two-thirds into the mounting surface.

4) Hang the HFPU on the screws then tighten the screws into the mounting surface.

5) Plug the first HPFU connector into BATT connector on the right side of the KSU.

6) Connect a ground wire from the HPFB "FG" screw to the DK8 QPSU8 screw labeled "HPFB6." The ground wire can be fed through the opening by the AC power cord (see Figure 4-3).

NOTE:
The DK8 should be plugged into AC power and the DC power switch should be turned on. The HFPU will not start to operate if AC power is not available during the initial installation.

7) The 24V LED on the HPFU should light. If it does not light, press the battery OFF switch with a pencil point or other small-tipped object.

8) Dress and tie-wrap the HPFU cables per Figure 4-4.

9) To mount a second HPFU, repeat steps 1~4, then plug the second HPFU connector in the first HPFU and connect an FG wire between each HPFB FG screw.

10) To test the HPFU, remove the DK8 AC plug from the AC outlet. The DK8 AC LED will go out but the DK8 DC LED remains on, also the system remains in normal working order and the HPFU 24V LED remains on.

11) If it is desired to turn off the HPFU (after loss of AC power), use a pencil or other sharp object to press the Battery Off switch.

CAUTION!
Once the HPFU is turned off or unplugged (During AC power loss) it will not operate again until AC power is restored to the DK8 KSU.

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3 POWER SUPPLY REMOVAL AND REPLACEMENT

3.00 The power supply comes factory-installed in the Key Service Unit (Figure 4-5); if necessary, it can be removed and replaced.

3.10 Power Supply Removal (Figure 4-5)

1) Make sure that the power supply switch is OFF and that the AC power cable is not plugged into an outlet. Confirm that green AC LED is not lit.

2) Loosen the screws on the front cover of the Key Service Unit, and remove the cover.

3) Unplug HPFB cable from BATT connector of power supply and disconnect the HPFB ground wire (Figure 4-5).

4) Unplug the AC cable from the CN1 connector on the power supply (Figure 4-5).

5) Remove the FG screw, and disconnect the green third wire ground ring terminal (Figure 4-5).

6) Unplug the DC cable from the CN3 connector on the power supply (Figure 4-5).

7) Remove the top two, and bottom left corner screws that attach the power supply to the Key Service Unit. Remove power supply.

3.20 Power Supply Replacement (Figure 4-5)

1) Set the power supply in its proper place in the Key Service Unit (Figure 4-5).

2) Secure the power supply to the Key Service Unit with the top two, and bottom left corner screws.

3) Install the green third wire ground ring terminal with the FG screw.

4) Plug the AC cable into the CN1 connector on the power supply (Figure 4-5).

5) Plug the DC cable into the CN3 connector on the power supply (Figure 4-5).

6) Plug the AC power cable into an outlet and turn ON the power supply switch.

7) Test QPSU8 power supply according to the DK8 Hardware Fault Isolation procedure, Section 100-816-500, Paragraph 6.

8) Plug HPFB cable into BATT connector of power supply and reconnect the HPFB ground wire (Figure 4-5).

9) Reinstall the cover on the key service unit.

4 DK8 POWER FAILURE EMERGENCY TRANSFER OPTION

4.00 A dedicated standard telephone can be connected to the Power Failure Transfer Interface (PF1) on the Key Service Unit to provide power failure backup. During normal operation, this telephone cannot be used—it does not count as a station; so it does not reduce the system's 10 maximum station capacity. But if there is a power failure, the telephone will automatically be connected to CO line 1. When power is restored, the system will automatically resume with its normal station and CO line assignments, and the dedicated telephone will become inoperative again.

4.10 DK8 Power Failure Emergency Transfer Installation. Install the dedicated emergency standard telephone as follows (see Figure 4-6):

1) Connect a standard telephone to the PF1 connector in the Base Unit.

4.20 DK8 Power Failure Emergency Transfer Test.

1) Turn the system power switch off.

2) Lift the emergency standard telephone handset, and verify that there is CO dial tone.

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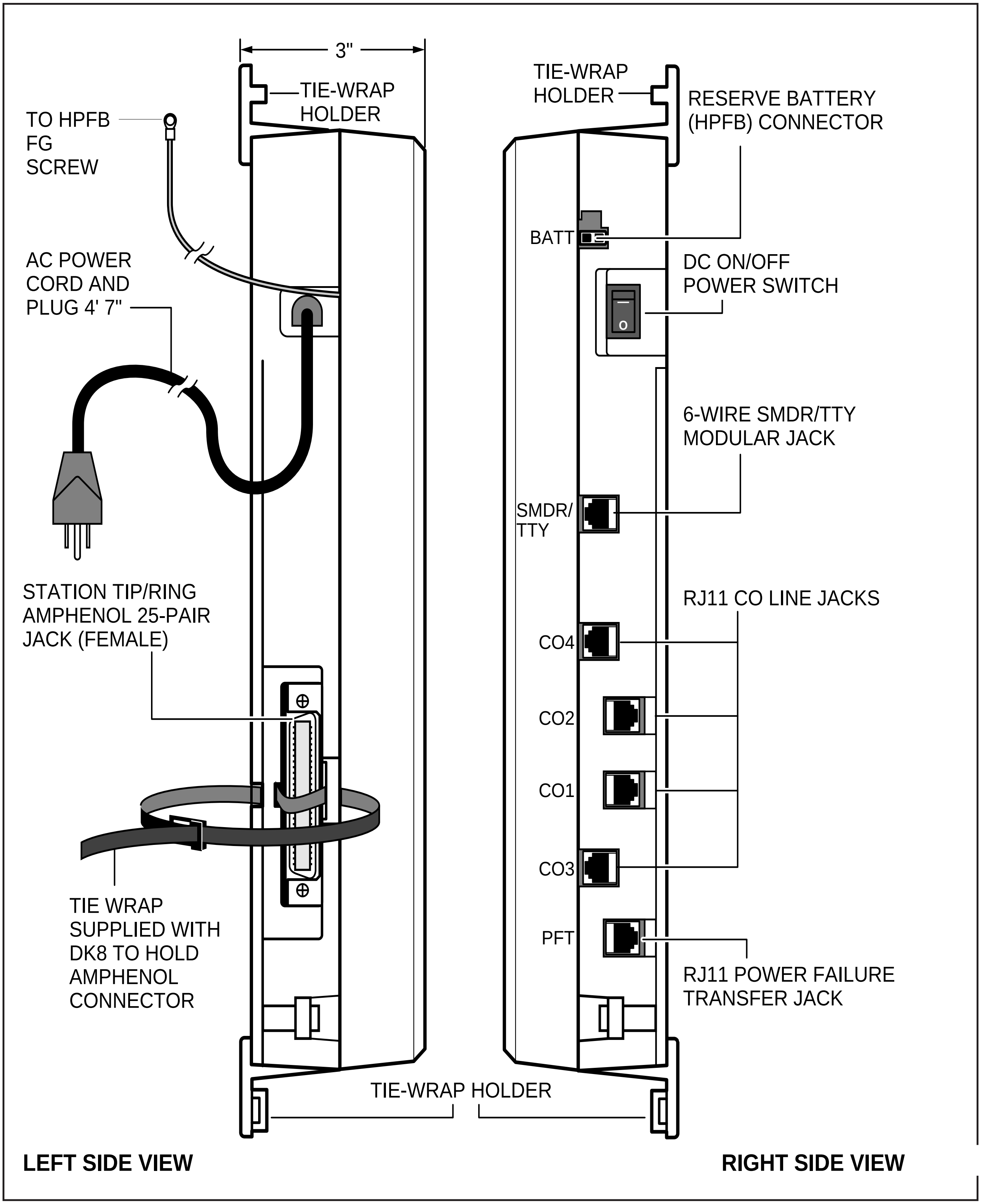


FIGURE 4-4
DK8 CABLING DIAGRAM

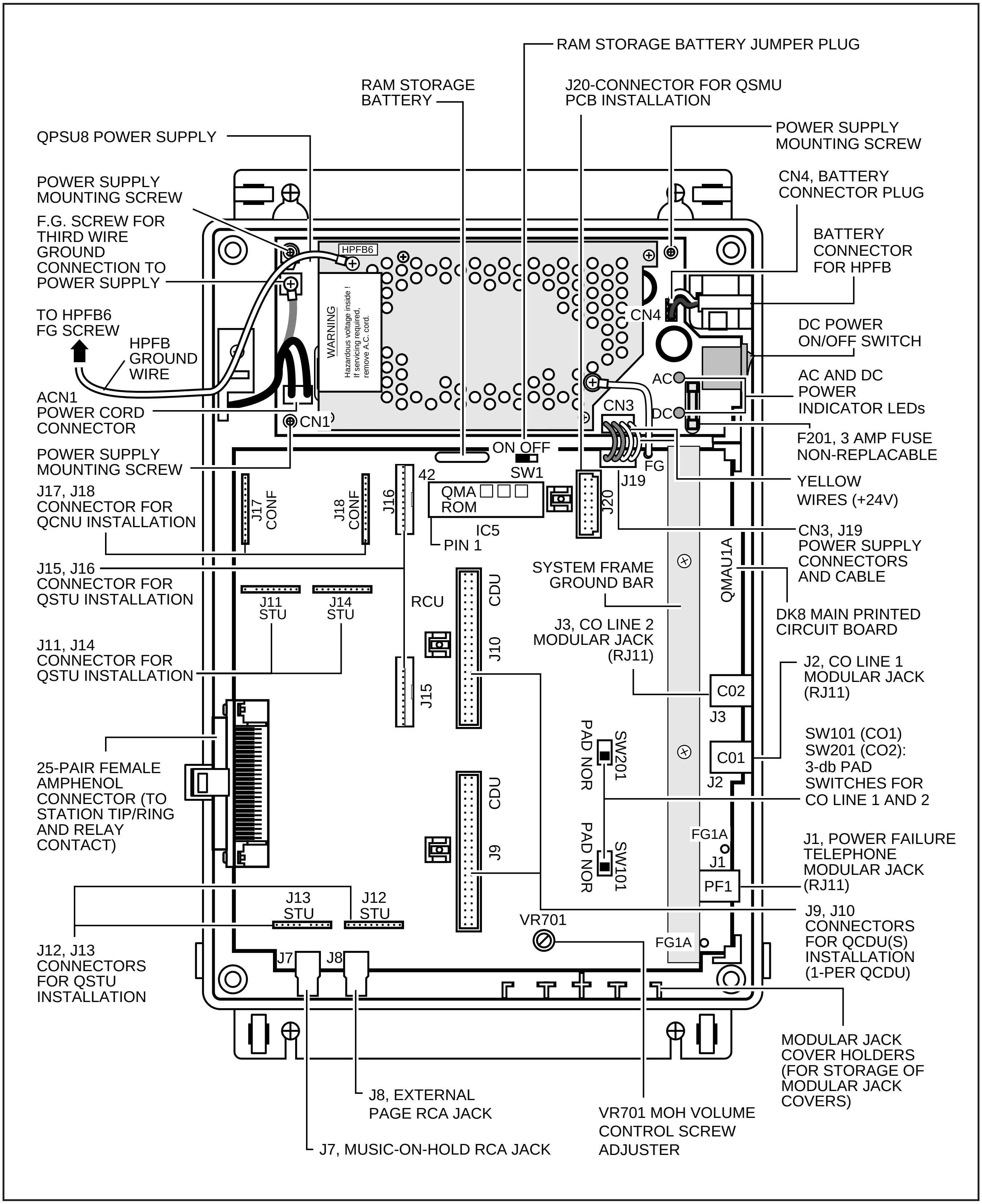


FIGURE 4-5
DK8 BASE UNIT JACKS AND CONNECTORS

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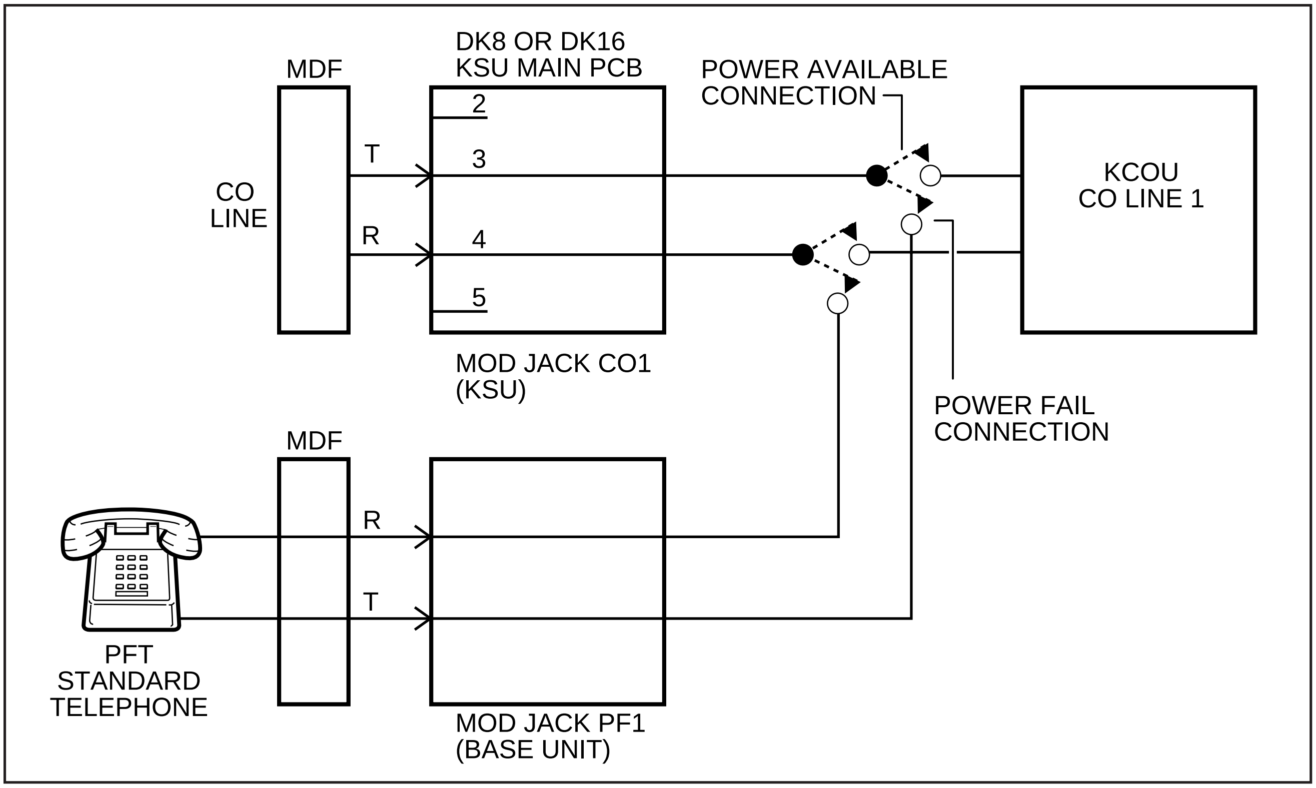


FIGURE 4-6
DK8 KEY SERVICE UNIT POWER FAILURE TRANSFER (PFT) CIRCUIT DIAGRAM

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PART II. PRINTED CIRCUIT BOARD INSTALLATION

5 GENERAL

5.01 This chapter provides procedures for installation of STRATA DK8 system optional printed circuit boards (PCBs) into the Key Service Unit. This includes installation instructions, optional configuration information, and wiring and programming considerations for each PCB.

5.02 Be sure the ground has been checked. (See **Chapter 2** for grounding.)

6 PCB INSTALLATION CONSIDERATIONS

6.01 The STRATA DK8 KSU comes standard with four digital telephone circuits (ports) and two CO line circuits. These circuits, along with the common control unit, are built into the motherboard.

6.10 KSU Option PCBs

6.11 The KSU can support up to five optional printed circuit boards (PCBs) (Figure 4-7): it can support a maximum of two QCDUs, each of which provides one CO line circuit and two digital telephone circuits; a QSTU which provides two standard telephone circuits (ports); a QRCU which provides three circuits to receive DTMF tones (required for DISA and devices connected to QSTUs), and three circuits to detect busy tone (required for the ABR feature); and a QSMU which provides a port for either a Station Message Detail Recording (SMDR) device or a maintenance terminal or modem (System Program 10-3, LED 04) selects the function of the port — SMDR or TTY).

6.12 The KSU does not come from the factory with any option PCBs installed. Each of the option PCBs listed above must be installed in specific locations as described later in this chapter.

> *NOTE:*
> *QCNU is a standard factory installed piggyback PCB which provides conference circuits allowing two simultaneous conferences with four of these parties on the first conference call and three parties on the second simultaneous conference.*

6.20 PCB Option Considerations

6.21 PCBs may be configured for a variety of hardware and software options. Hardware options are defined as either internal (generally related to optional PCB subassemblies) or external (related to connection of peripheral equipment such as background music, voice mail, etc). Hardware and software options for each PCB are identified in the individual PCB installation procedures in this chapter.

6.22 PCB Hardware Options. Each PCB must be configured for the applicable hardware options prior to installation of the PCB. Configuration instructions for internal hardware options are provided in the individual PCB installation procedures in this chapter. Configuration instructions for external hardware options are provided in Peripheral Installation, Section **100-816-207**.

6.23 PCB Software Options. PCBs are configured for software options through programming, after installation of the PCBs in the KSU. A programming overview for each PCB is provided in the individual PCB installation procedures in this chapter. Refer to the Programming Procedures, Section **100-816-300**, for detailed programming instructions.

6.30 PCB Installation/Power Supply Considerations

6.31 Whenever removing or installing PCBs it is recommended that the power supply be OFF.

7 CO LINE/DIGITAL TELEPHONE INTERFACE UNIT (QCDU)

7.00 General

7.01 The QCDU provides one loop start CO line circuit and two digital telephone circuits. The QCDU digital telephone circuits can support digital telephones, PDIU-DIs/PDIU-DI2s or ADMs connected to the telephones and PDIU-DSs. The QCDU does not support a DDSS console or DDCB. A maximum of two QCDU PCBs may be installed in the KSU.

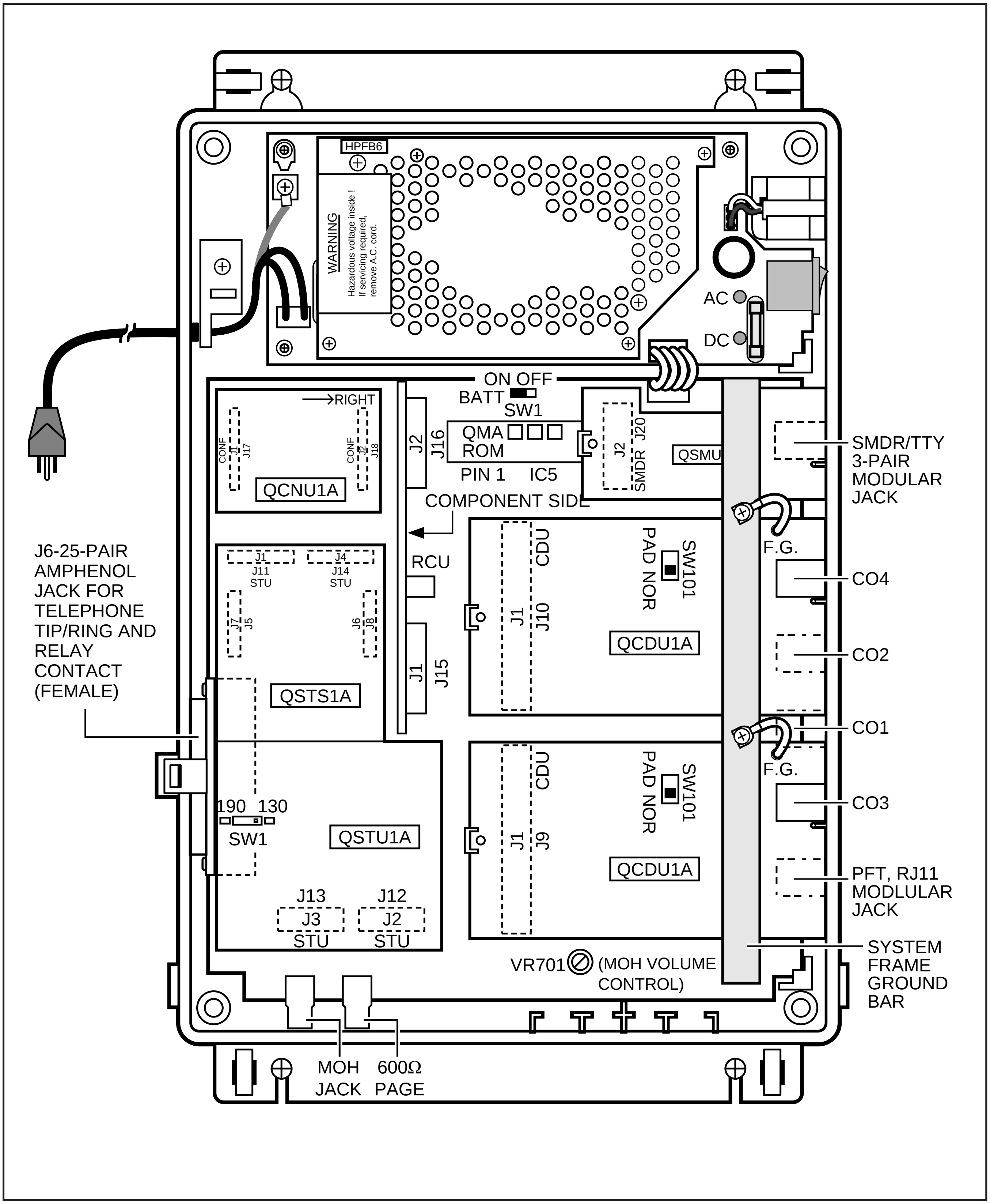
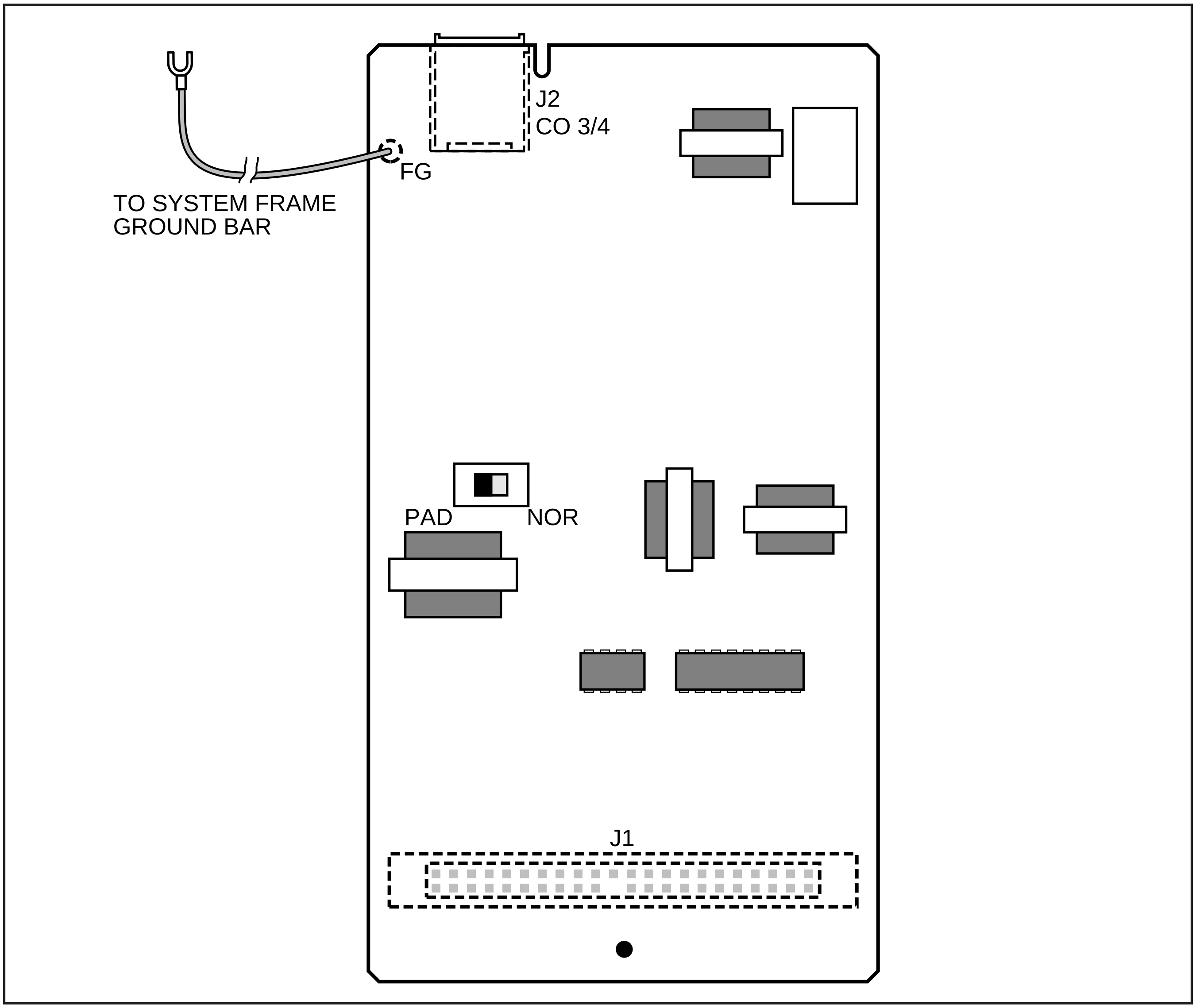


FIGURE 4-7
DK8 PRINTED CIRCUIT BOARD INSTALLATION

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FIGURE 4-8
QCDU CONTROLS AND INTERFACE CONNECTORS

7.02 The QCDU is shown in Figure 4-8.

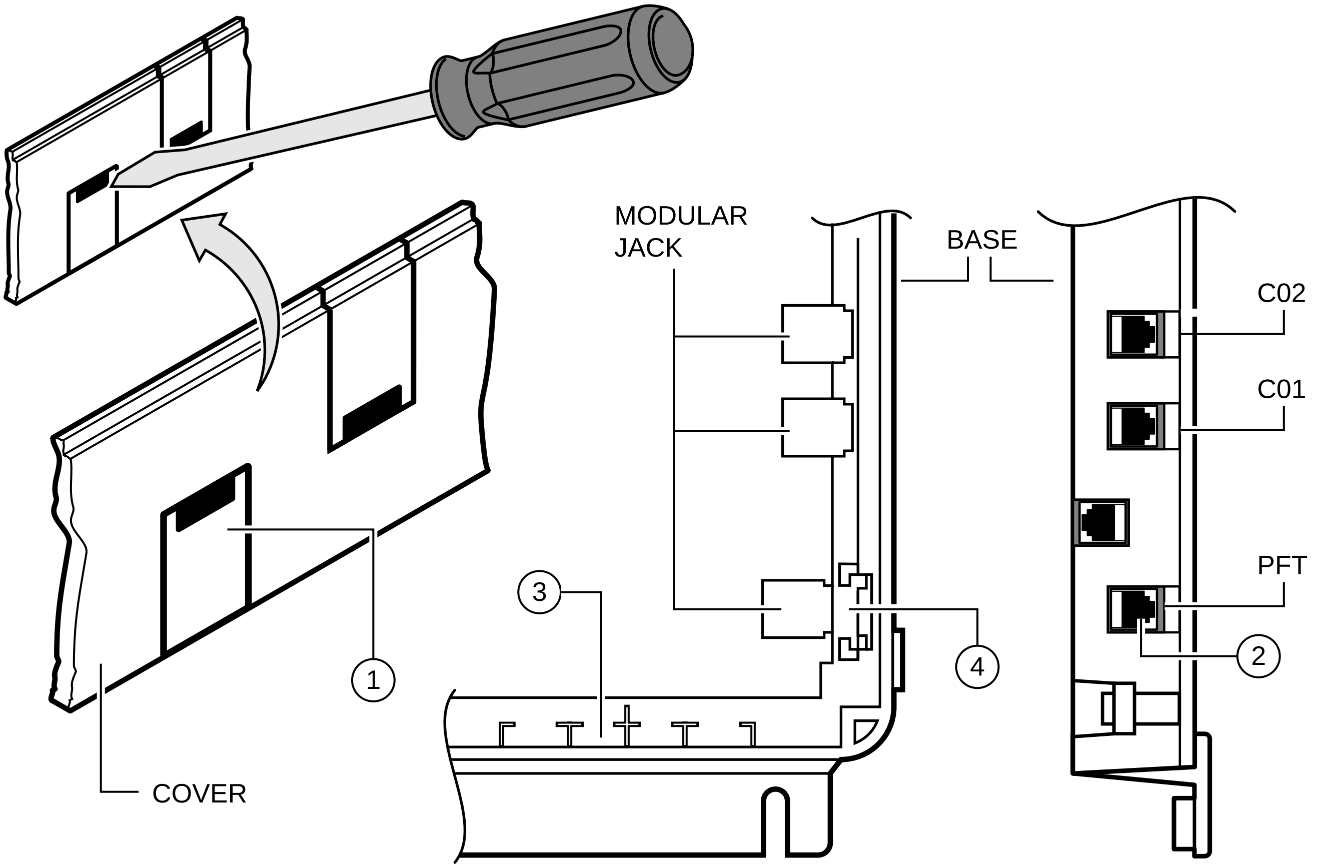
7.10 QCDU Configuration

7.11 The QCDU may have to be configured to control excessive loudness if the system is close to a CO or installed behind a PBX telephone system. It does not have to be configured for anything else. The decibel (db) PAD switch, **SW101** controls the loudness by providing a 3 db signal level drop to, or from, the PBX or CO when set to the PAD position. The switch comes from the factory set at NOR (for normal) meaning no PAD loss.

7.20 QCDU Installation Procedure

7.21 Install the QCDU in accordance with the following steps (Figure 4-7):

1) Remove the PCB from its protective packaging.
2) If the system is located within one mile of the CO or PBX telephone system, set db **PAD** switch **SW101** to the PAD position.
3) Make sure that the power supply switch is OFF.



1. KNOCK OUT JACK COVER WHEN OCDU, SMDR/TTY IS INSTALLED
2. TAKE OUTJACK COVER WHEN PFT IS CONNECTED
3. STORE THE JACK COVER THAT HAS BEEN TAKEN OUT IN THE JACKCOVER HOLDER
4. REINSTALL THE JACK COVER WHEN THE PFT TELEPHONE IS UNPLUGGED

FIGURE 4-9
MODULAR JACK COVER REMOVAL AND STORAGE

4) Slide front edge and FG wire of QCDU under the "System Frame Ground Bar", align and insert QCDU connector **J1** into the motherboard connector (**J9** for CO3 first, **J10** for CO4 second), and apply firm, even pressure to ensure proper mating of the connectors. Make sure the edge of the QCDU next to the connector **J1** snaps firmly into the standoffs on the KSU motherboard.

5) Connect the Frame Ground (FG) lead from the QCDU to the screw nearest the QCDU located on the system Frame Ground bar.

6) Remove the "knock-out" from the KSU cover **CO3** or **CO4** access slot, and store the "knock-out" in the slots provided in the KSU base (Figure 4-9).

7.30 QCDU Wiring

7.31 Refer to the DK8 MDF to CO Line Wiring Diagram in Section **100-816-208** for wiring/interconnecting details.

7.40 QCDU Programming Overview

7.41 The following parameters may be specified, through programming, for the QCDU.

Program 10-1
- Allows/denies two-CO Line Conference and Direct Inward System Access (DISA).

Program 15
- Auto Release detection; DISA, and other attributes to the CO line.

Program 16
- Assigns CO line to groups 81 ~ 84, and dial 9 group.

Program 40
- Assigns stations access to CO line (incoming and outgoing access).

8 STANDARD TELEPHONE INTERFACE UNIT (QSTU)

8.00 General

8.01 The QSTU provides two standard telephone circuits. The QSTU supports two-wire devices such as standard telephones, Auto Attendant devices, separate BGM source connection, voice mail machines, and facsimile machines.

NOTE:
For the system to recognize the Dual-Tone Multi-Frequency (DTMF) tones generated by standard telephones (or any other device connected to a QSTU port), a QRCU must be installed.

8.02 The QSTU is shown in Figure 4-10. Note that the QSTS PCB is factory installed on the QSTU.

8.10 QSTU Configuration

8.11 The QSTU only has to be configured for the ring generator voltage level, nothing else. Before installing the QSTU in the KSU, set the **SW1** ring generator to 130V P-P or 190V P-P (Figure 4-10). Most standard telephones and two-wire devices require 190; however, some devices may experience ring-trip at 190, and should be set at 130.

8.20 QSTU Installation Procedure

8.21 Install the QSTU in accordance with the following steps (Figure 4-7):

1) Remove the PCB from its protective packaging.
2) Set the ring voltage jumper plug **SW1** to select the appropriate ring generator voltage level, either 130V P-P or 190V P-P.
3) Make sure that the power supply switch is OFF.
4) Align and insert QSTU connectors **J1**, **J2**, **J3**, and **J4** motherboard connectors **J11**, **J12**, **J13**, and **J14** respectively, and apply firm, even pressure to ensure proper mating of the connectors.

8.30 QSTU Wiring

8.31 Refer to DK8 MDF to KSU Amphenol Wiring in Section **100-816-208** for QSTU wiring.

8.32 The QSTU must be connected to a OL13A (or equivalent) type lines for off-premises stations. (300 ohms loop resistance max., including the telephone or other devices DC off hook resistance.)

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8.40 QSTU Programming Overview

8.41 The following parameters may be specified for the QSTU:

Program 31
- Used to configure all QSTU ports connected to voice mail (see Chapter **7** for voice mail installation).

Program 10-2
- Used to set standard telephone ringing option and separate BGM assignment.

NOTE:
QSTU Ports are fixed. They are assigned even if a QSTU is not installed.

9 DTMF RECEIVER/ABR TONE DETECTOR UNIT (QRCU)

9.00 General

9.01 The QRCU must be installed to recognize

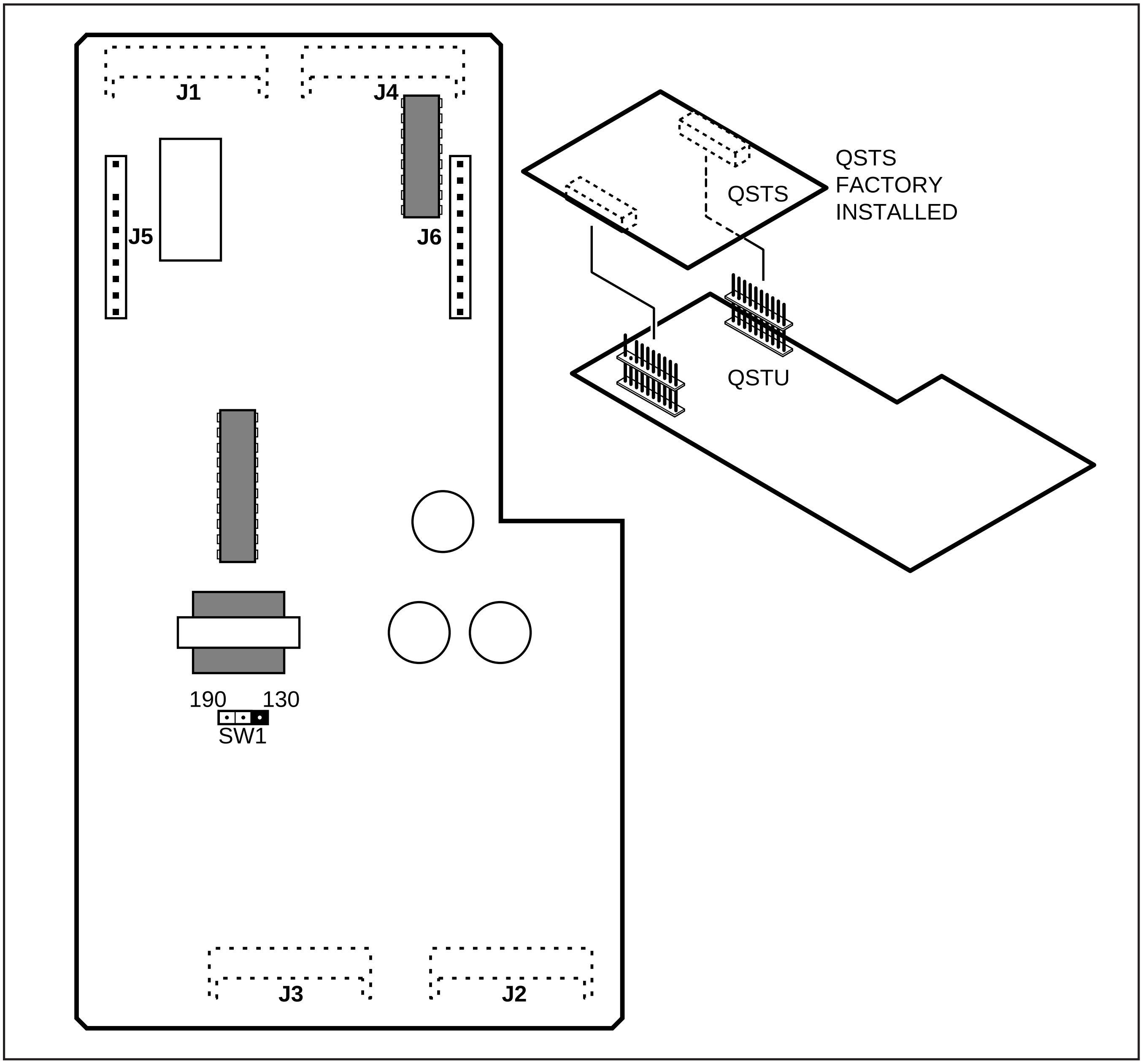


FIGURE 4-10
QSTU CONTROLS AND INTERFACE CONNECTORS

Dual-Tone Multi-Frequency (DTMF) tones generated by a standard telephone (or any other device connected to a standard telephone circuit (QSTU)), and it is required for Direct Inward System Access (DISA) calls. The QRCU circuits are also used to detect busy tone for the Automatic Busy Redial (ABR) feature and must be installed to allow ABR to operate.

9.02 The QRCU is shown in Figure 4-11.

9.10 QRCU Configuration

9.11 The QRCU does not have to be configured for operation.

9.20 QRCU Installation Procedure

9.21 Install the QRCU in accordance with the

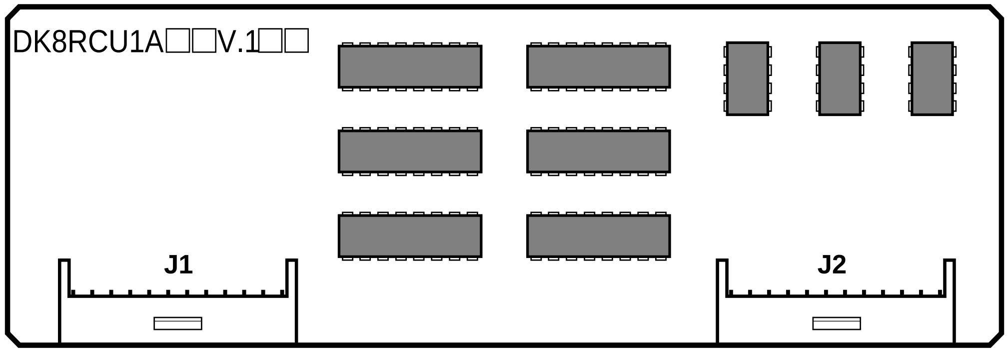


FIGURE 4-11
QRCU INTERFACE CONNECTORS

following steps (Figure 4-7).

1) Remove the PCB from its protective packaging.

2) Make sure that the power supply switch is OFF.

3) Align and insert QRCU connectors **J1** and **J2** into motherboard connectors **J15** and **J16** respectively (note the component side placement in Figure 4-7), and apply firm, even pressure to ensure proper mating of connectors. Push down until connectors lock together.

9.30 QRCU Wiring

9.31 The QRCU does not require any wiring.

9.40 QRCU Programming Overview

9.41 The following parameters may be specified:

Program 12
- Set QRCU release time.

Program 15
- Sets QRCU operation after CO line flash.

10 CONFERENCE CIRCUITS (QCNU)

10.00 General

10.01 The QCNU provides two conference circuits which allow two simultaneous conferences (one four-party and one three-party). The QCNU is standard and is installed at the factory. If it is necessary to remove and replace the QCNU, turn the system off, remove the QCNU, and install another QCNU per paragraph **10.20**.

10.02 The QCNU is shown in Figure 4-7.

10.10 QCNU Configuration

10.11 The QCNU does not have to be configured for operation.

10.20 QCNU Installation Procedure

10.21 Install the QCNU in accordance with the following steps (Figure 4-7):

1) Remove the PCB from its protective packaging.

2) Make sure that the power supply switch is OFF.

3) Align and insert QCNU connectors **J1** and **J2** into motherboard connectors **J17** and **J18** respectively, and apply firm, even pressure to ensure proper mating of connectors. (Note the side with "→ **RIGHT**" silkscreened on it should be positioned as shown in Figure 4-7.)

10.30 QCNU Wiring

10.31 The QCNU does not require any wiring.

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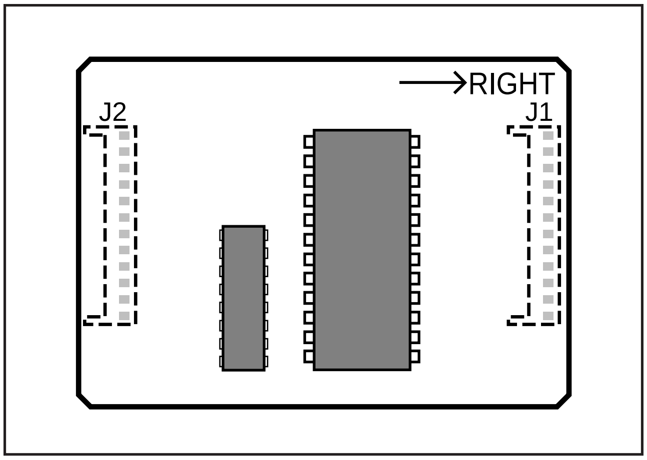


FIGURE 4-12
QCNU INTERFACE CONNECTORS

10.40 QCNU Programming Overview

10.41 The QCNU does not require any programming.

11 OPTION INTERFACE UNIT (QSMU)

11.00 General

11.01 The QSMU provides a circuit interface with peripheral options.

11.02 The QSMU is shown in Figure 4-13.

11.10 QSMU Hardware Options

11.11 The QSMU supports the following STRATA DK8 external hardware options:

- SMDR output or TTY (maintenance) port two-way interface.

  NOTE:
  Refer to Peripheral Equipment Installation, Section ***100-816-207****, for installation of SMDR and the Remote Maintenance Section 100-816-600 for TTY.*

11.20 QSMU Configuration

11.21 The QSMU must be configured for operation with the appropriate external hardware: either an SMDR printer or call accounting device; Remote Maintenance Terminal (TTY) or modem; and in System Programm 10-3:

- LED 04 ON — TTY
- LED 04 OFF — SMDR

11.30 QSMU Installation Procedure

11.31 Install the QSMU in accordance with the following steps (See Figure 4-7):

1) Remove the PCB from its protective packaging.
2) Ensure the QSMU has been configured for the appropriate program options (refer to Paragraphs **11.10 and 11.20**).
3) Slide the QSMU under the "System Frame Ground Bar", align and insert QSMU connector **J2** into motherboard connector **J20,** ensuring the side of the QSMU with the modular connector goes on the right side. (The QSMU is not silkscreened "⟶ **RIGHT**".) Apply firm, even pressure to ensure proper mating of connectors. Make sure the edge of the QSMU opposite connector **J2** snaps firmly into the standoffs on the KSU motherboard.

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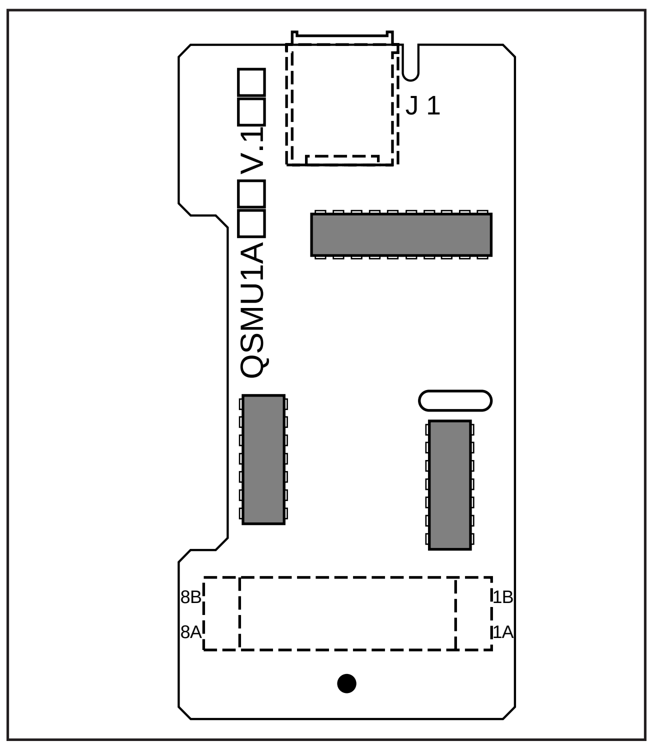


FIGURE 4-13
QSMU CONTROLS AND INTERFACE CONNECTORS

4) Remove the "knock-out" from the KSU cover **SMDR/TTY** access slot, and store the "knock-out" in the slots provided in the KSU base (Figure 4-9).

11.40 QSMU Wiring

11.41 Refer to Peripheral Equipment Installation (Section **100-816-207, SMDR**) and Remote Maintenance (Section **100-816-600, TTY**) for QSMU wiring/interconnecting details.

11.50 QSMU Programming Overview

11.51 The following parameters may be specified, through programming, for the QSMU:

Program 60

- Assigns SMDR options.

Program 10-3

- LED04-SMDR/TTY Select option.

11.60 Device Communication Parameters

11.61 Set the communication parameters for the device connected tot he QSMU SMDR/TTY jack as follows:

- TTY: 7 Bits, 1-Stop Bit, Even Parity
- SMDR: 8 Bits, 1-Stop Bit, Odd Parity
- TTY/SMDR: 1200 bps

12 BUILT-IN CO LINE, DIGITAL TELEPHONE, AND OTHER CIRCUITS

12.00 General

12.01 As mentioned in Paragraph **6**, the KSU comes standard with two CO lines and four digital telephone circuits already installed.

12.10 Built-in CO Line Circuits

12.11 The two standard loop start CO line circuits are integrated into the KSU motherboard and are identical to the QCDU CO line circuits. For wiring and programming considerations, see the QCDU instructions in Paragraph **7**.

12.20 Built-in Digital Telephone Circuits

12.21 The four digital telephone circuits that come standard with the system are integrated into the motherboard in the KSU. These circuits are identical to the digital circuits found on the QCDU. The motherboard does not have to be configured for the digital circuits to operate. For wiring and programming considerations, see the QCDU instructions in Paragraph **7**.

12.30 KSU Motherboard CO Line/Digital Station Circuit Wiring

12.31 Refer to Section **100-816-208** for details.

- Station circuits: DK8 MDF to KSU Amphenol Wiring Diagram
- CO lines: DK8 MDF TO CO Line (KSU and QCDU) Wiring Diagram

12.40 Power Failure Telephone Installation

1) Remove the RJ11 cover (Figure 4-9) from the PFT jack and store the jack cover.

2) Connect the power failure telephone (500/2500-type standard telephone to the PFT jack. (Refer to the DK8 MDF to CO Line Wiring Diagram in Section **100-816-208**.

12.50 Music-On-Hold (MOH)/Background Music (BGM) Source Connection

12.51 Connect the MOH/BGM source to the MOH RCA jack (Figure 4-7) in accordance with Music Source Configuration A in Section **100-816-207**.

12.60 External Page Output Connection

12.61 Connect the external page system to the 600Ω PAGE RCA output jack (Figure 4-7) to an external amplifier in accordance with the External Page Installation guidelines in Section **100-816-207**.

Strata® DK16

INSTALLATION

CHAPTER FIVE
DK16 KSU AND PCB INSTALLATION

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TABLE OF CONTENTS

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TABLE OF CONTENTS (continued)

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FIGURE LIST

TABLE LIST

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IMPORTANT INITIAL INSTALLATION NOTES!

These minimum installation steps must be carried out for proper system operation.

1. ***Set the SW1 switch in the Base Unit ON for BATTERY OPERATION; otherwise, all programmed customer data will be lost on power down.***

2. ***If required, install KSTU and K4RCU in the Base Unit.***

3. ***If the system is configured with an Expansion Unit, follow the order prescribed below:***
   a) ***Install PDKU, PEKU, PSTU, PESU, or KCDU in Slot 04.***
   b) ***If installing two KCDUs, install a KCDU in Slot 05. (The other KCDU should be installed in Slot 04.)***
   c) ***If the system is configured with a PCOU, install it in Slot 05. (The system cannot be configured with both a PCOU and KCDU in the Expansion Unit.)***
   d) ***If the system is configured with a PIOU or PIOUS, install it in Slot 06. (Slot 07 should be reserved for future use.)***

4. ***Initialize Programs 00 ~ 97 by running Program 90.***

5. ***Run Program 92.***

6. ***Enter the hardware configuration with Program 03, exit the programming mode, turn power OFF for five seconds, then turn power back ON.***

WHEN LATER ADDING KSU PCBs

1. ***Install new PCBs and set the new configuration with Program 03. (Turn power OFF for five seconds after running Program 03.)***

2. ***Program new features, options, etc. created by new additions.***

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PART I. KSU INSTALLATION

1 GENERAL

1.00 This chapter provides the instructions necessary to mount both the STRATA DK16 Base Key Service Unit and the Expansion Key Service Unit. Instructions are also provided on how to test, remove, and replace the power supply and base unit CO line interface subassembly.

2 KEY SERVICE UNIT MOUNTING

2.00 Mounting Surface Considerations

2.01 The Base Key Service Unit and the optional Expansion Key Service Unit are both designed to be mounted on a wall or other vertical surface. It is recommended to use Method 1 or 2 in Figure 5-2 (see Note).

NOTE:
If mounting the KSU directly to a wall, be sure to align screws with studs behind the wall; if using a hard board between the KSU and the wall, install screws first to the hard board, and then secure the hard board to the wall, making certain that screws are aligned with studs.

2.10 Mounting Preparation

1) Loosen the screws on the front cover and the side cover of the Base Key Service Unit, and remove the covers (Figure 5-1).

2) Move the **SW1** Memory Battery Backup strap on the motherboard to the ON position (Figure 5-3).

3) If applicable, install the K4RCU into the Base Key Service Unit (see Paragraph **14**).

4) If applicable, install the KSTU into the Base Key Service Unit (see Paragraph **6**).

5) Plug the AC power cable into an outlet (Figure 5-3).
   - The "AC" LED on the power supply will light green (If not, refer to the Fault Finding section later in this manual).

6) Turn the switch on the power supply to the ON position (Figure 5-3).
   - The "DC" LED on the power supply will light green. (If not, refer to the Fault Finding section later in this manual).

7) Using a voltmeter or other device which checks voltage, measure the voltages referenced to frame ground (FG) at the **DC OUT connector pins** (test points) located on the motherboard (Figure 5-3). The voltages should fall within the ranges below. If the voltages do not fall within the ranges, unplug the DC power pins from the DC OUT connector and measure again at the same location; if the ranges remain unacceptable, replace the power supply (see Paragraph **3**).
   - Yellow-Green, Black, and Green Wires: 0V
   - Yellow Wire: -24V
     - Range: -26.3V ~ -27.8V
   - Red Wire: 5V
     - Range: 4.5V ~ 5.5V
   - Blue Wire: -5V
     - Range: -4.5V ~ -5.5V

2.20 Mounting the Base Key Service Unit

1) Make sure the power supply switch is turned OFF.

2) Place the Base Key Service Unit on the desired location on the mounting surface and mark the location of the four screw holes (there is one on each corner). See Figure 5-2.

NOTE:
Make sure the location of the Base Key Service Unit meets the minimum clearance requirements specified in Figure 2-2 in Chapter 2.

3) Drill holes on these marks.

NOTE:
If mounting the KSU directly to a wall, be sure to align screws with studs behind the wall; if using a hard board between the KSU and the wall, install screws first to the hard board, and then secure the hard board to the wall, making certain that screws are aligned with studs.

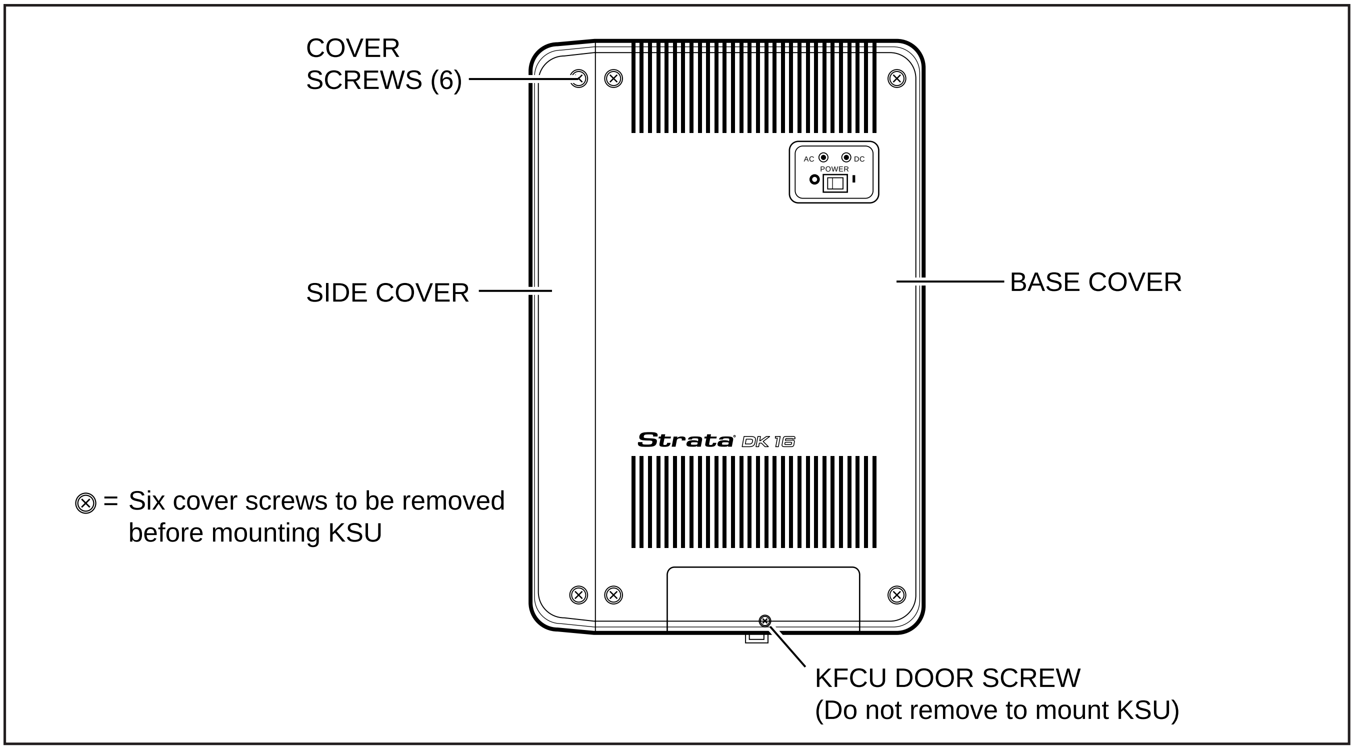


FIGURE 5-1
DK16 BASE KEY SERVICE UNIT EXTERIOR

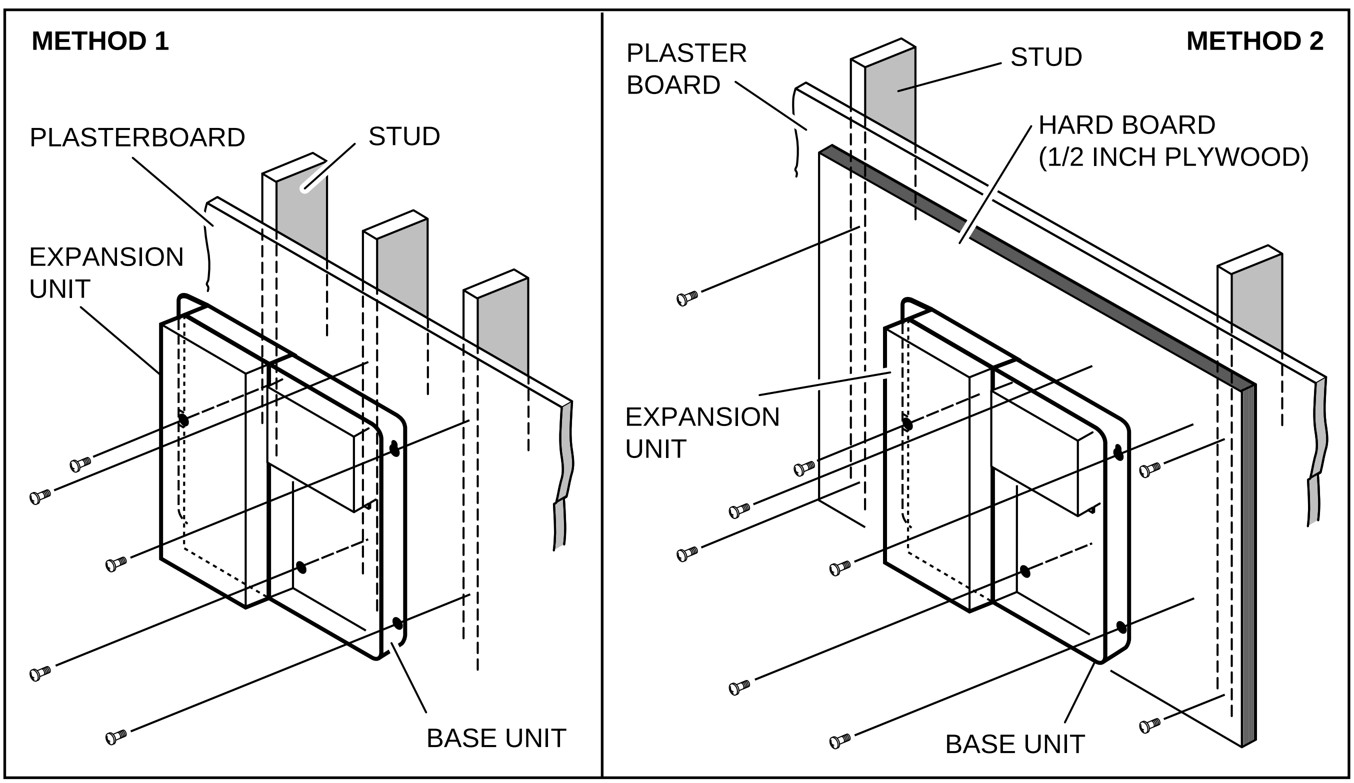


FIGURE 5-2
DK16 BASE KEY SERVICE UNIT WALL MOUNTING METHODS

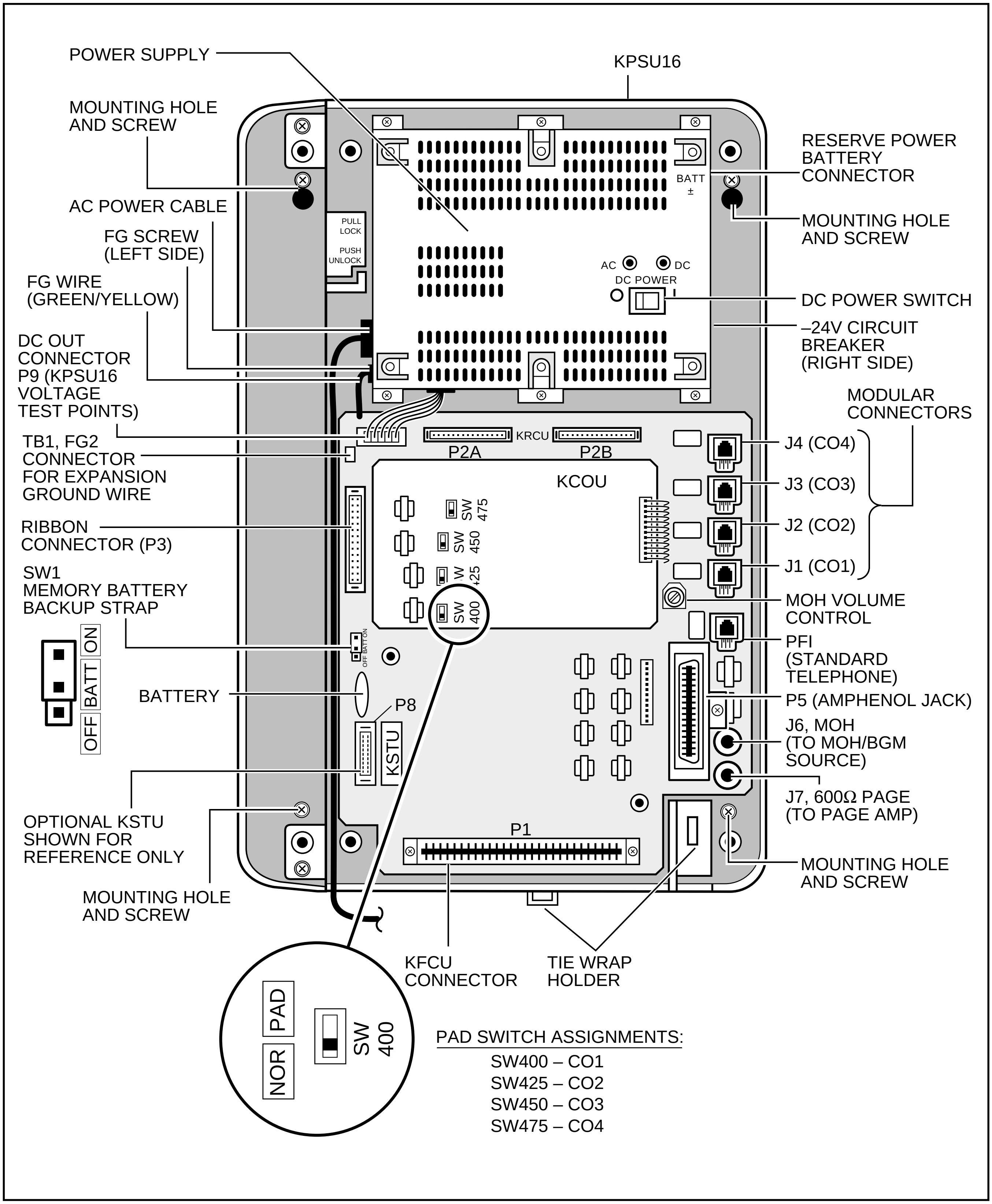


FIGURE 5-3
DK16 BASE KEY SERVICE UNIT INTERIOR

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4) Secure screws approximately two thirds of the way into the top two holes on the mounting surface.

5) Hang the unit from the top two screws and then secure the screws completely into the mounting surface.

6) Finish securing the unit to the mounting surface by completley screwing the bottom two screws into the wall.

7) Ground system according to Chapter 2, paragraph 4.

8) Connect applicable wiring (modular CO line cords, 25-pair amphenol connector cable, etc.) to the Base Key Service Unit and then fasten wiring to the unit with the tie wrap that comes with the base unit (Figure 5-4). Remove amphenol connector clamp from plastic bag that comes with the Base Unit. Fasten the clamp to hold the amphenol connector.

9) Connect Reserve batteries (per Paragraph **2.40**) and plug battery cable into BATT connector of the KPSU16 power supply (Figure 5-3 and 5-4).

10) Set the KCOU PAD switches (SW400-SW475) to the appropriate position (Figure 5-3). The factory setting is NORMAL. If CO lines are connected to a PBX or are in close proximity to the central office the PAD position may be required.

11) If the Expansion Key Service Unit is going to be installed, refer now to Paragraph **2.30**. If not, proceed to Step 12.

12) Plug the AC power cable into an outlet and then turn ON the power supply switch.

13) Reinstall the front and side covers onto the Base Key Service Unit.

2.30 Mounting the Expansion Key Service Unit

1) Make sure the side cover is removed from the Base Key Service Unit. Turn Base Key Service Unit DC power switch off.

2) Set the Expansion Key Service Unit on the Base Key Service Unit's hinge mounts, making sure that the Expansion Unit sets properly in place (Figure 5-5).

3) Remove safety lock from plastic bag which comes with the Expansion Unit. Install safety lock to the Base Unit as shown in Figure 5-5.

4) Pull out on the safety lock until it can no longer be moved, securing the Expansion Key Service Unit to the Base Key Service Unit (Figure 5-5). Do not detach the lock from the Base Key Service Unit.

5) Connect the Expansion Key Service Unit Ribbon Cable to the connector on the Base Key Service Unit (Figure 5-5). Close ribbon cable connector lock on Base Unit.

6) Connect Expansion Unit green/yellow ground wire plug (FG2) to TB1 of the Base Unit. (Make sure the plug locks on TB1.) See Figure 5-3 and 5-4.

7) Making sure that the Expansion Key Service Unit is flush against the mounting surface, mark the location of the Expansion Unit mounting screw hole (Figure 5-6).

8) Swing the Expansion Key Service Unit away from the mounting surface, and drill a hole at the mark made in Step 7.

9) Install applicable printed circuit boards (PCBs) (see Chapter 5, Section II)—after PCBs are installed, slide the slot lock to the lock position (Figure 5-7).

10) Swing the Expansion Key Service Unit back to the mounting surface and secure it to the surface with a screw.

11) Connect applicable wiring (modular CO line cords, 25-pair amphenol connector, etc.) to the PCBs (Figure 5-8).

12) Fasten the wiring with tie wraps (supplied) to the bottom of the Expansion and Base Key Service Units (Figure 5-8).

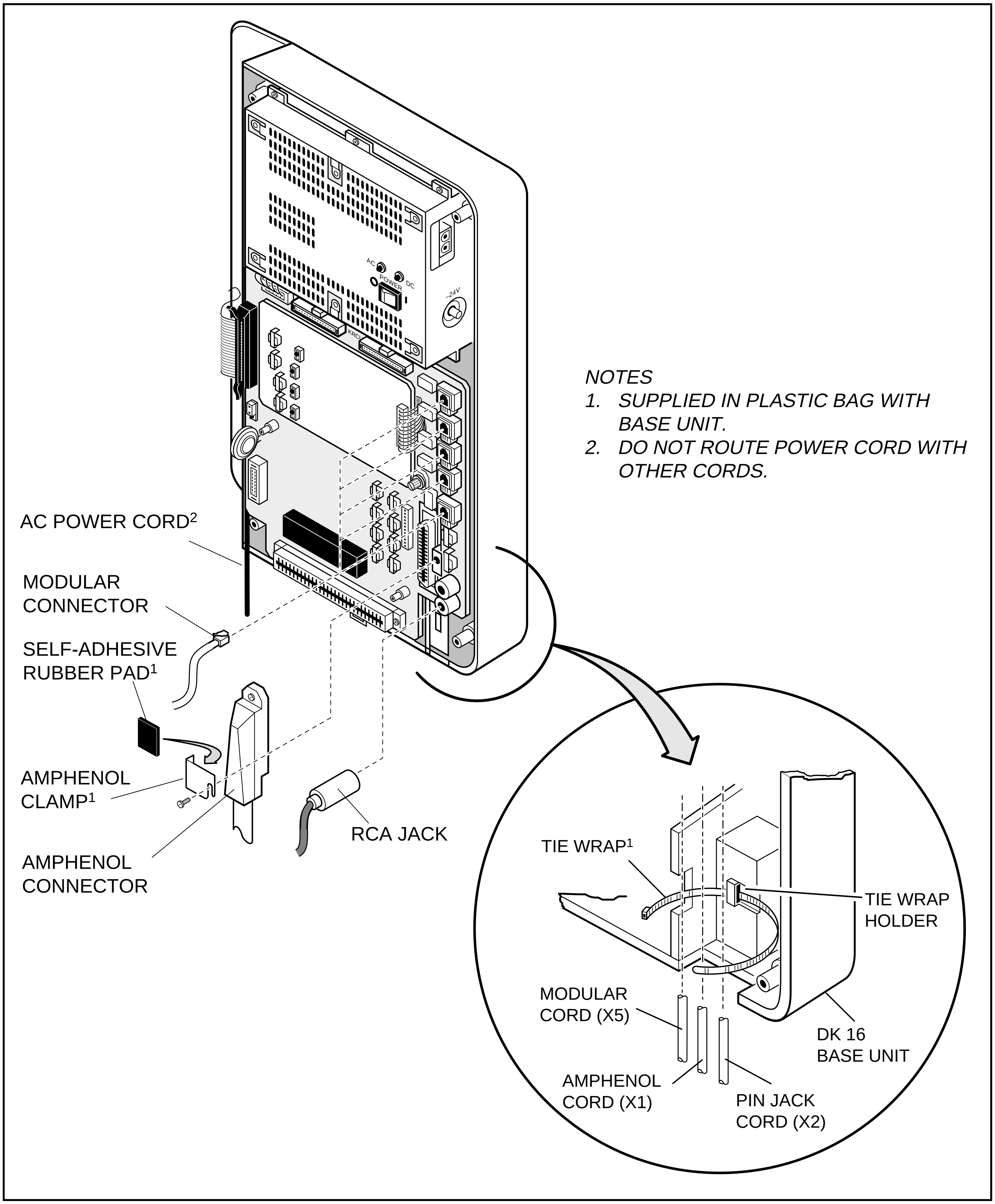


FIGURE 5-4
DK16 BASE KEY SERVICE UNIT WIRING CONNECTIONS

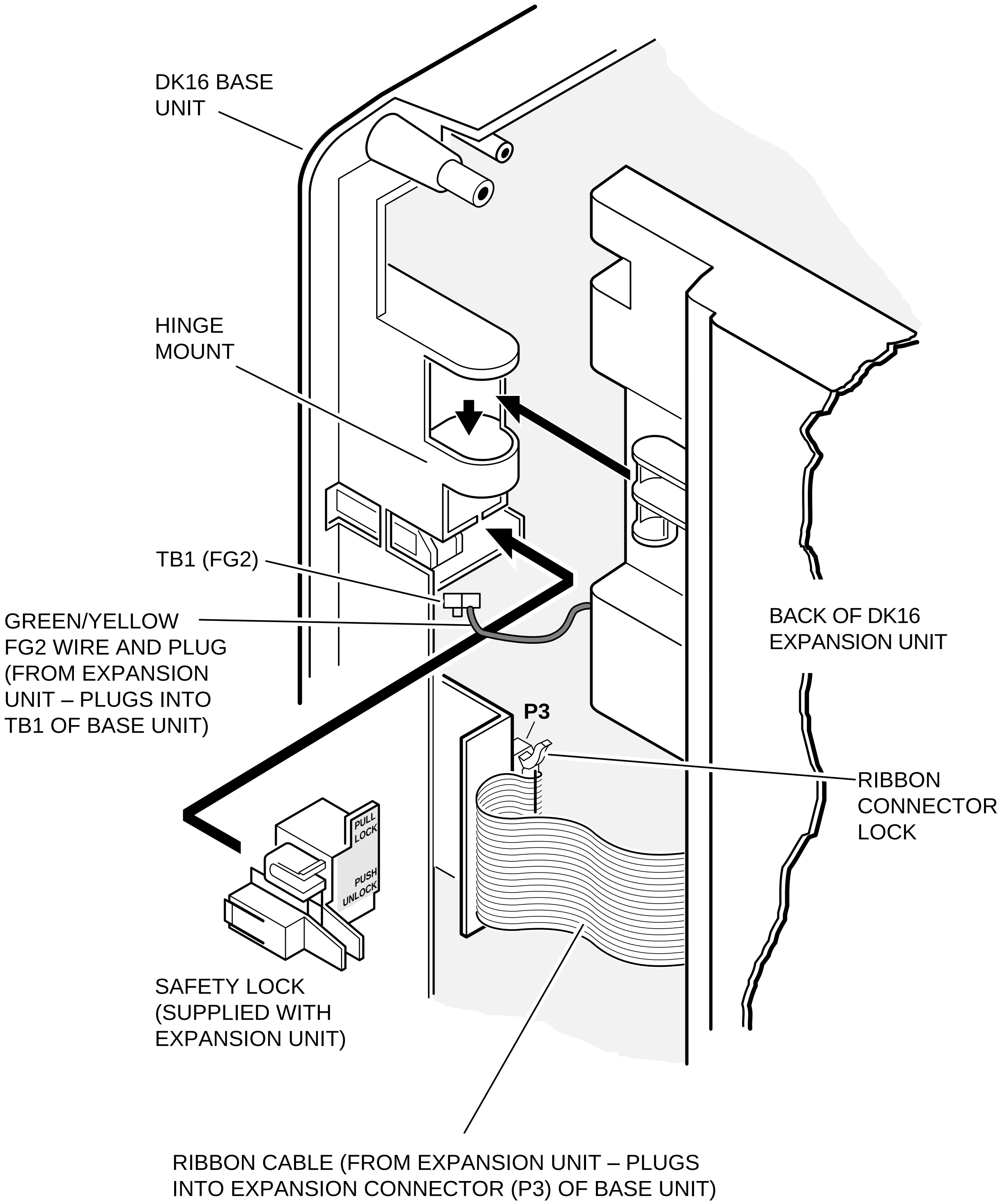


FIGURE 5-5
CONNECTING THE DK16 EXPANSION UNIT TO THE DK16 BASE UNIT

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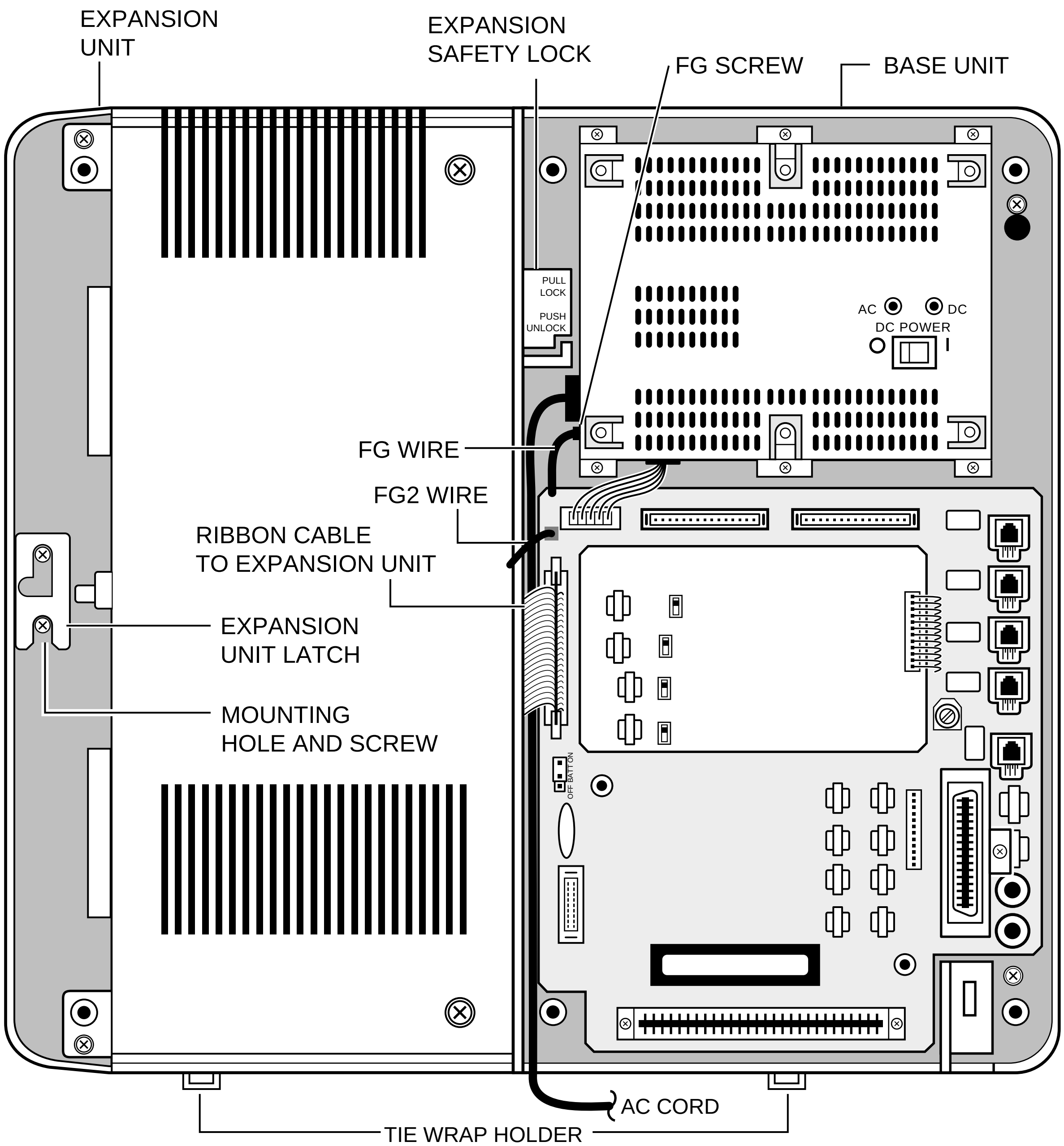


FIGURE 5-6
MOUNTING THE DK16 EXPANSION UNIT

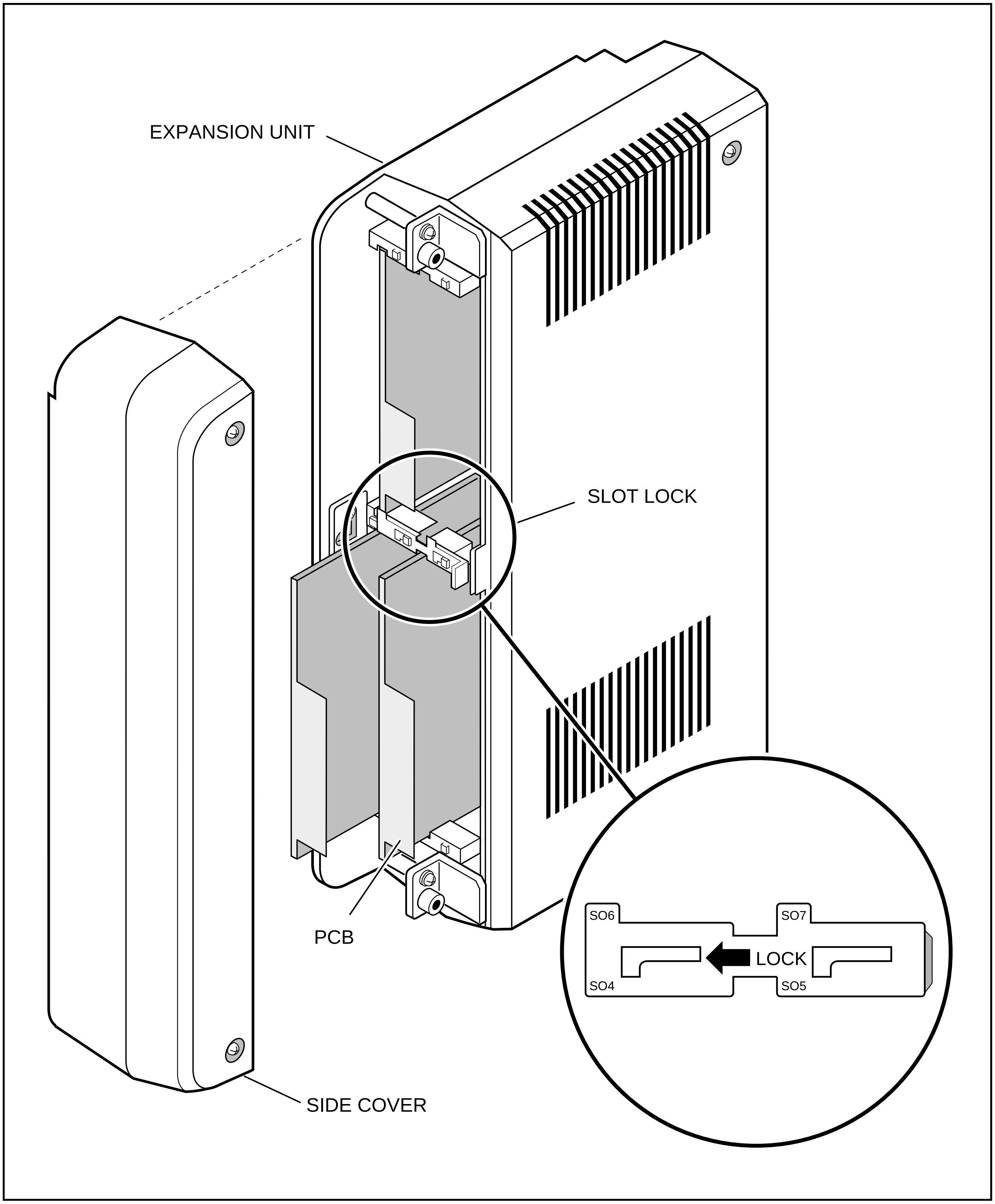


FIGURE 5-7
DK16 EXPANSION UNIT INTERIOR

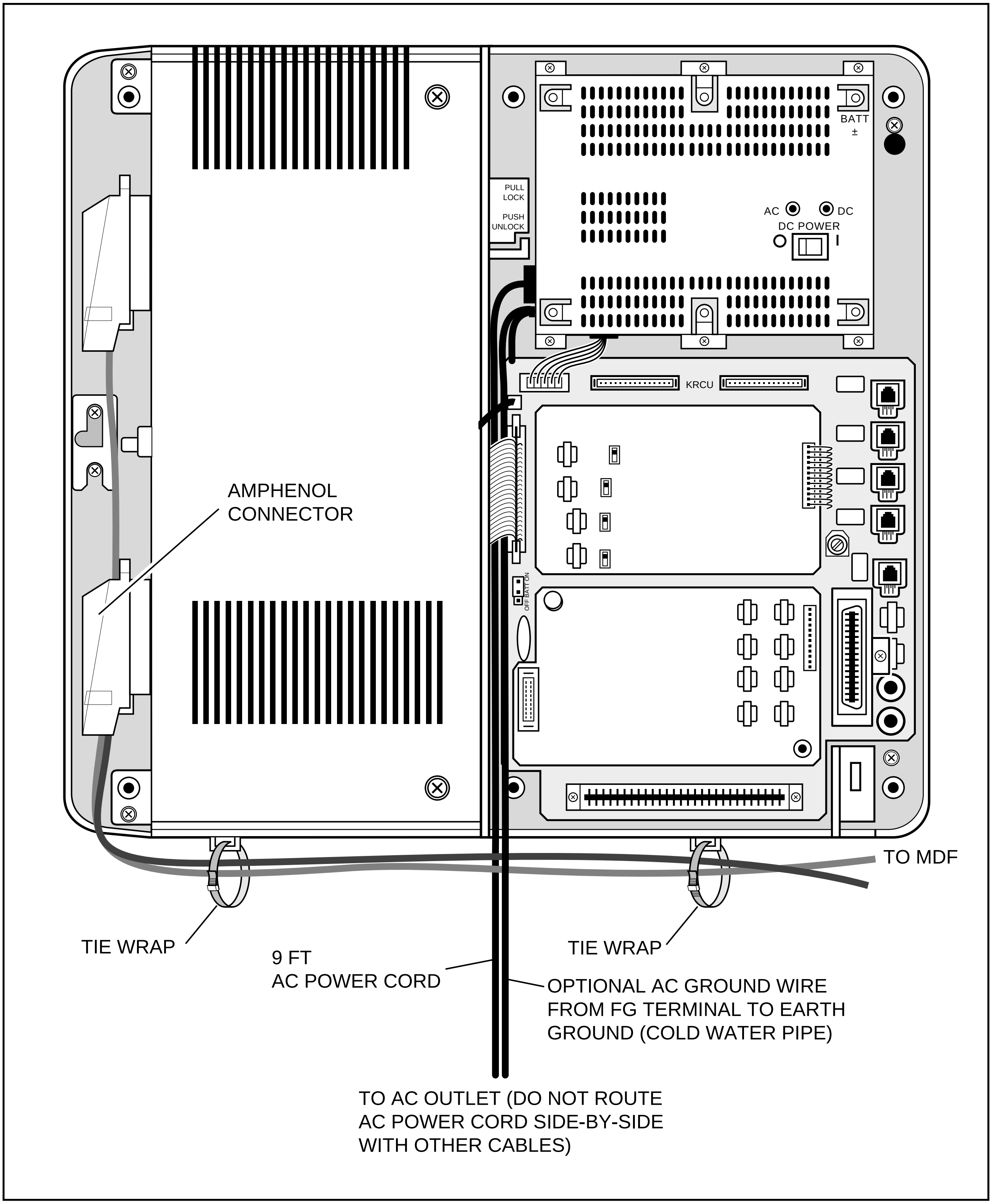


FIGURE 5-8
DK16 EXPANSION UNIT WIRING CONNECTIONS

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13) Knock out the tab on the bottom of the side cover.

14) Plug the AC power cable into an outlet and then turn ON the power supply switch.

15) Install the side cover to the Expansion Key Service Unit (Figure 5-7).

2.40 Reserve Power/Power Failure Options

2.41 The STRATA DK systems offer two options to protect system operation in the event of a power failure; the Reserve Power option (Paragraph 2.42-2.44), and the Power Failure Emergency Transfer option (Paragraph 17).

2.42 Reserve Power Option STRATA DK16 system power supply provides the capability of connecting a reserve power source (two customer supplied 12-volt batteries) to ensure uninterrupted system operation in the event of a power failure. A pre-assembled interface cable for installation of the Reserve Power option is available from Toshiba (PBTC-3M), refer to Figure 5-9.

IMPORTANT NOTE!
Local ordinances may dictate battery type and installation details.

2.43 The batteries require a well-ventilated location close (within 9 feet) to the system —the interface cable is 9 feet long.

WARNING!
To reduce the risk of fire or injury to persons, read and follow these instructions:

1. ***Use only the following type and size batteries: 12-volt, gelcell.***
2. ***Do not dispose of the batteries in a fire. The cells may explode. Check with local codes for possible special disposal instructions.***
3. ***Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.***
4. ***Exercise care in handling batteries in order not to short the battery with conduction materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.***
5. ***Charge the batteries provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual.***
6. ***Observe proper polarity orientation between the batteries and battery charger.***

2.44 Reserve Power Installation. Install the Reserve Power option in accordance with the following steps (refer to Figure 5-9):

1) Connect the **PBTC-3M** black jumper wire from the positive terminal of one 12VDC battery to the negative terminal of the second 12VDC battery.

2) Ensure that a serviceable 10-ampere fuse is installed in the in-line fuse holder of the **PBTC-3M** battery cable.

3) Connect the white lead of the **PBTC-3M** battery cable to the open positive terminal of the 12VDC battery. Connect the black lead to the open negative terminal of the second 12VDC battery.

IMPORTANT NOTE!
The KSU must be connected to the live operating (HOT) AC power source, and the power supply ON/OFF switch set to ON prior to the final step of connecting the reserve power batteries to the power supply via the BATT +/- receptacle. If the batteries are connected after AC power is lost, reserve power will not function.

4) Connect the **PBTC-3M** battery cable two-prong male plug to the power supply BATT +**/-** receptacle.

5) To test reserve power operation, disconnect the system AC power plug with the power supply power **ON/OFF** switch in the **ON** position. The system should continue to operate without any interruption.

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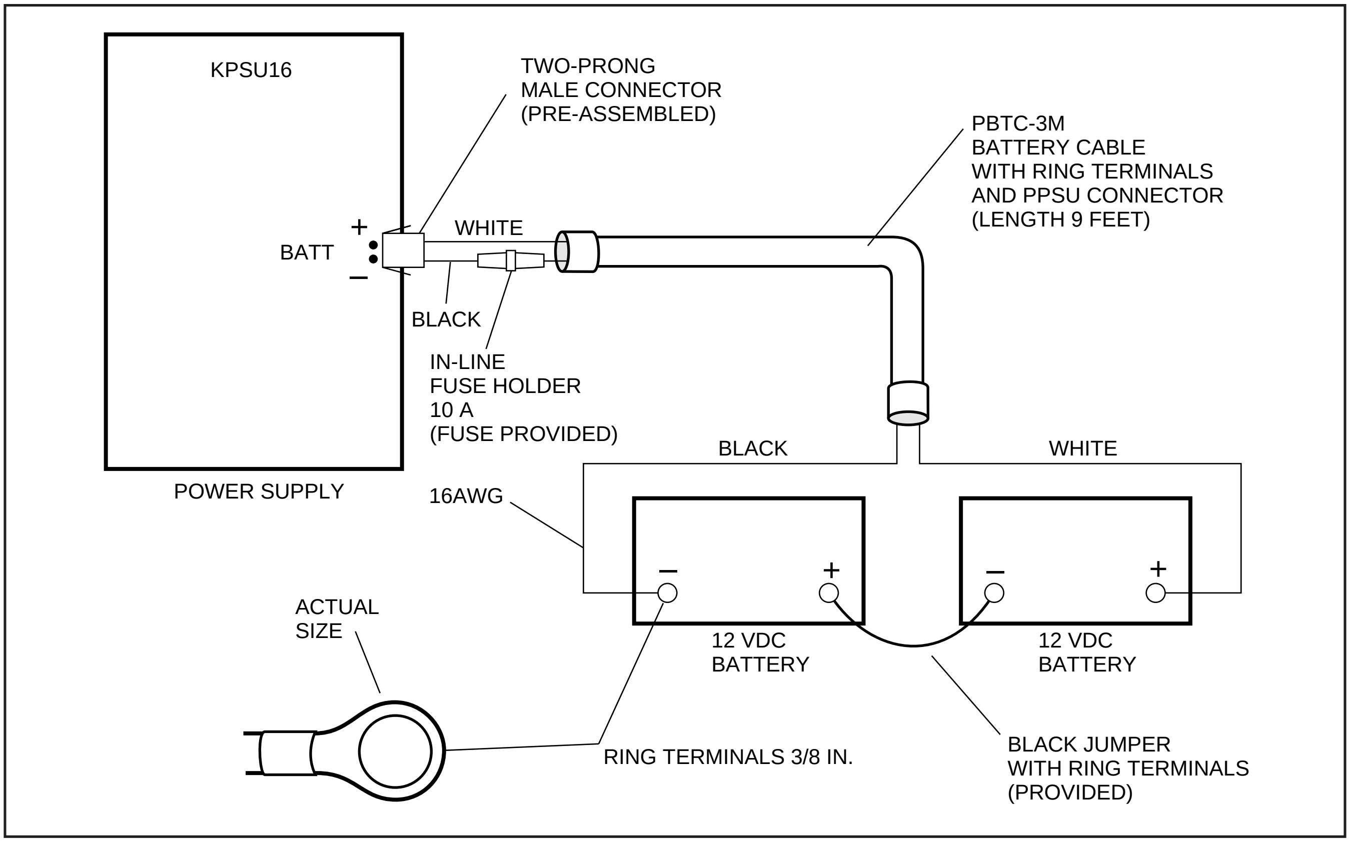


FIGURE 5-9
RESERVE POWER/BATTERY WIRING

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3 POWER SUPPLY REMOVAL AND REPLACEMENT

3.00 The power supply (KSPU 16) comes factory-installed in the Base Key Service Unit (Figure 5-10); if necessary, it can be removed and replaced.

3.10 Power Supply Removal

1) Make sure that the power supply switch is OFF and that the AC power cable is not plugged into an outlet. Confirm that green AC LED is not lit.

2) Unplug reserve battery cable from BATT connector of power supply (Figure 5-10).
3) Remove K4RCU PCB and Expansion Unit
4) Unplug the DC cable from the DC OUT connector (see Figure 5-10).
5) Remove FG screw from left side of power supply to free FG wire/terminal and building ground wire.

6) Remove the six screws that attach the power supply to the Base Key Service Unit. Remove power supply.

3.20 Power Supply Replacement

1) Route FG1 wire (soldered on both sides of Base Unit motherboard) so it will be under the power supply inside of standoffs (see Figure 5-10).

2) Set the power supply in its proper place in the Base Key Service Unit (see Figure 5-9).

3) Secure the power supply to the Base Key Service Unit with the six screws.

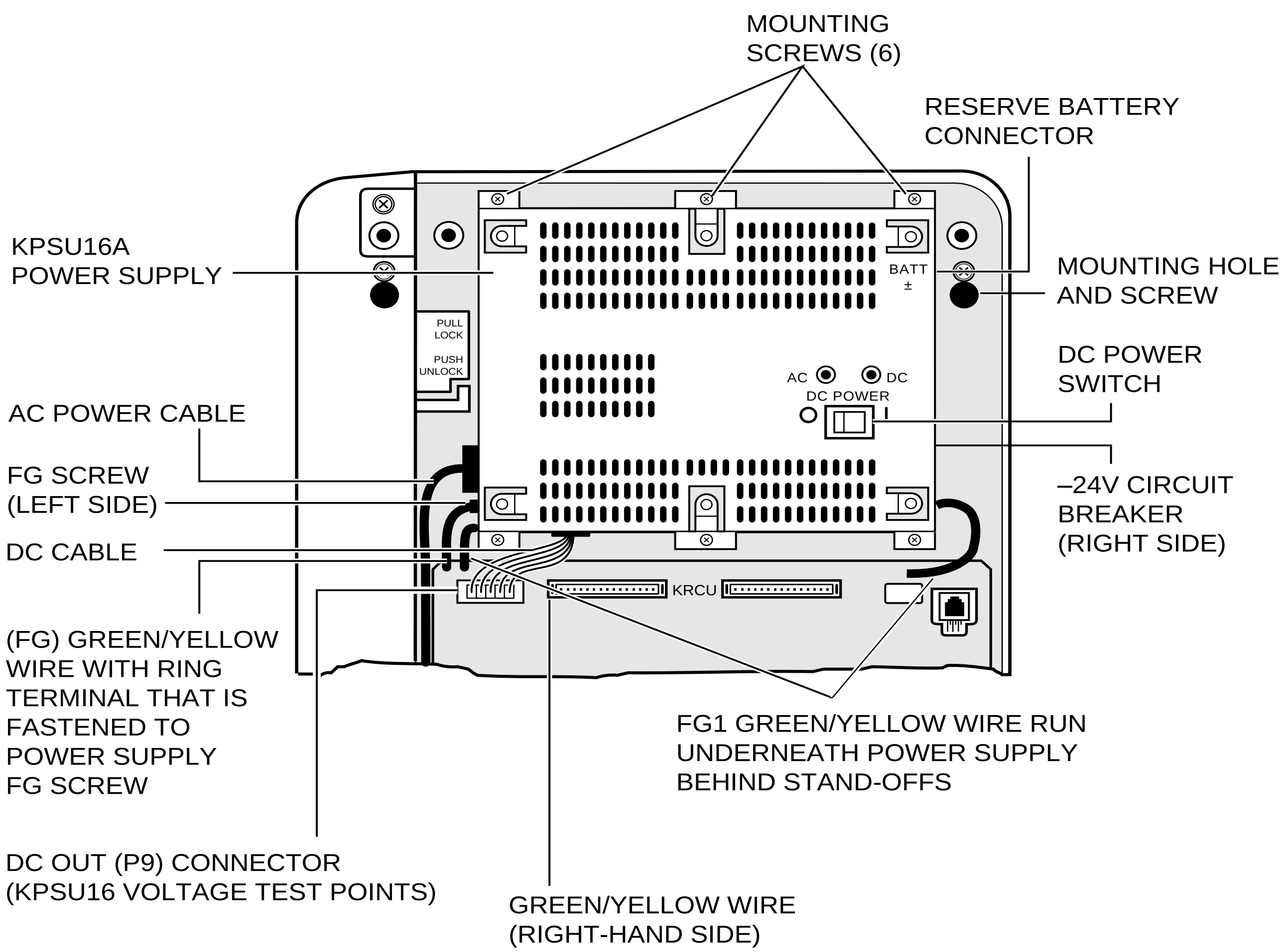


FIGURE 5-10
POWER SUPPLY (KPSU16)

4) Plug the DC cable into the DC OUT connector. Green/yellow wire is on right-hand side (Figure 5-10).

5) Fasten FG green/yellow wire ring terminal and building ground wire to the left side of the power supply with the FG screw.

6) Re-install K4RCU PCB (if required).

7) Plug the AC power cable into an outlet and turn ON the power supply switch.

8) Refer to Paragraph **2.10** to confirm that the power supply is working properly.

9) Plug reserve battery cable into BATT connector of power supply (Figure 5-10).

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PART II. DK16 PRINTED CIRCUIT BOARD INSTALLATION

4 GENERAL

4.01 This chapter provides procedures for installation of STRATA DK16 system printed circuit boards (PCBs) into the Base and Expansion units. This includes installation instructions, optional configuration information, and wiring and programming considerations for each PCB.

4.02 Be sure the power supply has been tested, and the ground has been checked. (See Chapter **5**, Section I for the power supply and Chapter **3** for grounding.)

4.03 It is recommended to install the Base Unit option PCBs K4RCU and/or KSTU before mounting the Base KSU on the wall.

4.04 Begin Expansion PCB installation only after completion of Expansion Unit installation (see Chapter **5**, Section I).

5 DK16 PCB INSTALLATION CONSIDERATIONS

5.01 The STRATA DK16 Base Unit comes standard with eight digital telephone circuits (ports) and four CO line circuits. The digital circuits are integrated into the motherboard, and the CO line circuits are on the KCOU which is attached to the P6 and P7 connectors on the motherboard. The common control unit, like the digital telephone circuits, is built into the motherboard.

5.10 DK16 Base Unit PCBs

5.11 The Base Unit can support an optional KSTU printed circuit board (PCB) which provides four standard telephone circuits (ports). In addition, a K4RCU PCB can be installed to receive DTMF tones, and detect busy tone for Automatic Busy Redial (ABR) operation.

5.20 DK16 Expansion Unit PCBs

5.21 The Expansion Unit can support a number of PCBs: it can support a PCOU which provides four CO line circuits; one or two KCDUs which provide two CO line circuits and four digital telephone circuits (ports); a PDKU which provides eight digital telephone circuits (ports); a PEKU which provides eight electronic telephone circuits (ports); a PESU which provides two standard and four electronic telephone circuits (ports); a PSTU which provides eight standard telephone circuits (ports); and a PIOU or PIOUS which both provide a port for a Station Message Detail Recording (SMDR) device, an interface for remote maintenance, and relay control options.

5.22 The DK16 Expansion Unit does not come from the factory with any PCBs installed. Any of the PCBs listed above can fit into any of the unit's four universal slots; however, it is recommended that PCBs that support electronic or digital telephones be installed into Slots 04 and 05, because Slots 06 and 07 cannot support Off-hook Call Announce or Data Interface Units (DIUs).

Recommended PCB slot assignments:

- KCDU — Slot 04 and 05 (2 maximum)
- PDKU, PEKU, PESU, PSTU — Slot 04 (1 maximum, cannot be installed with KCDU.)
- PCOU — Slot 05 (1 maximum, cannot be installed with KCDU.)
- PIOU/PIOUS — Slot 06 (1 maximum)

5.30 PCB Option Considerations

5.31 PCBs may be configured for a variety of hardware and software options. Hardware options are defined as either internal (generally related to optional PCB subassemblies) or external (related to connection of peripheral equipment such as background music, voice mail, etc). Hardware and software options for each PCB are identified in the individual PCB installation procedures in this chapter.

5.32 PCB Hardware Options. Each PCB must be configured for the applicable hardware options prior to installation of the PCB. Configuration instructions for internal hardware options are provided in the individual PCB installation procedures in this chapter. Configuration instructions for external hardware options are provided in Peripheral Installation, Section **100-816-207**.

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5.33 PCB Software Options. PCBs are configured for software options through programming, after installation of the PCBs in the KSU. A programming overview for each PCB is provided in the individual PCB installation procedures in this chapter. Refer to the Programming Procedures, Section **100-816-300**, for detailed programming instructions.

5.40 PCB Installation/Power Supply Considerations

5.41 Whenever removing or installing PCBs it is recommended that the power supply be OFF.

6 BASE UNIT STANDARD TELEPHONE INTERFACE UNIT (KSTU)

6.00 General

6.01 The optional KSTU provides four standard telephone circuits and it can only be installed in the Base Unit. The KSTU supports the two-wire devices such as standard telephones, Auto Attendant devices, voice mail machines, and facsimile machines. The KSTU can also support an alternate Background Music (BGM) source on circuit 4.

NOTE:
For the system to recognize the Dual-Tone Multi-Frequency (DTMF) tones generated by standard telephones (or any other device connected to a KSTU port), a K4RCU must be installed in the Base Unit.

6.02 The KSTU is shown in Figure 5-11 and its connectors and controls are described in Table 5-A.

6.10 KSTU Configuration

6.11 The KSTU only has to be configured for the ring generator voltage level, nothing else. Before installing the KSTU in the Base Unit, set the **SW540** ring generator to 130V P-P or 190V P-P. Most standard telephones and two-wire devices require 190; however, some devices may experience ring-trip at 190, and should be set at 130.

6.20 KSTU Installation Procedure

6.21 Install the KSTU in accordance with the following steps:

1) Make sure that the power supply switch is

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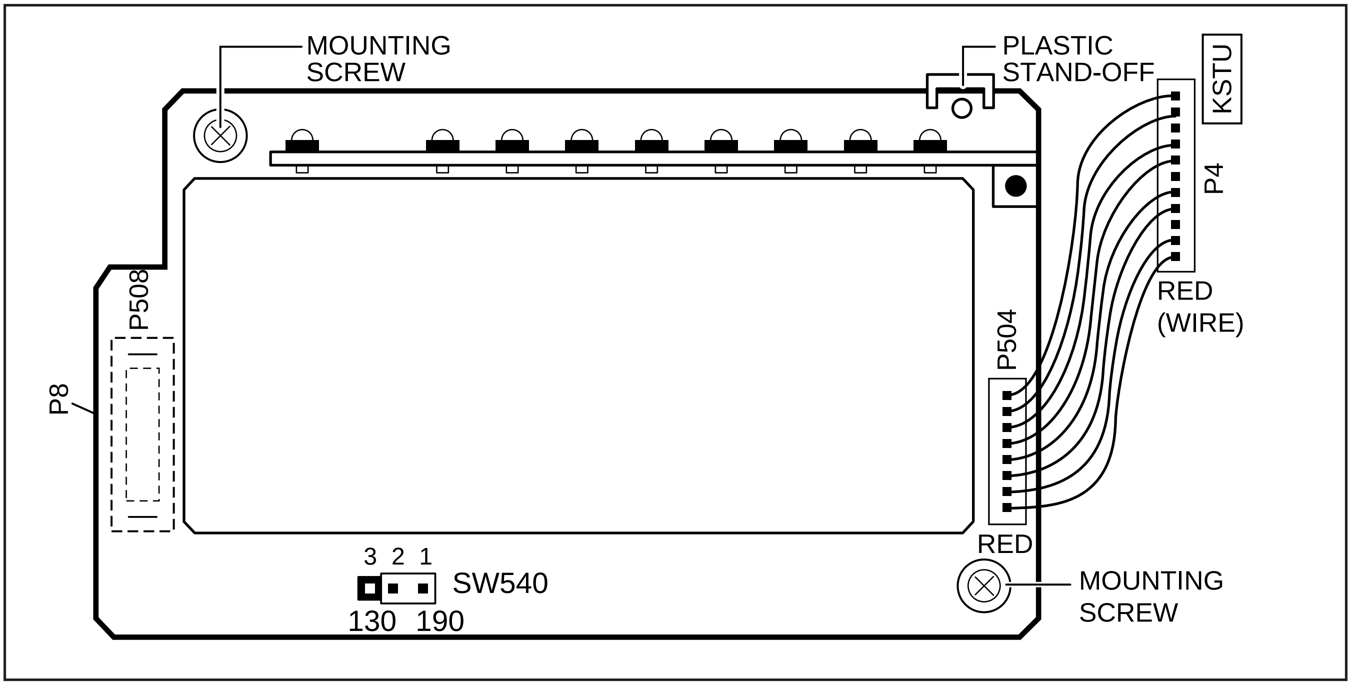


FIGURE 5-11
KSTU OPTIONS AND CONNECTORS

TABLE 5-A
KSTU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-11)	TYPE OF COMPONENT	DESCRIPTION
Ring Voltage Jumper Plug SW540	Three-terminal jumper	Sets ring generator voltage level for all circuits: H = 190V P-P L = 130V P-P
Connector P508	Female Connector	Mates to male connector P8 on the motherboard.
Connector Cable P504	Cable	Connects to P4 connector on the motherboard.

OFF.

2) Plug the KSTU cable into the **P4** connector on the motherboard in the Base Unit. The red wire on the cable should match up with pin 1 on the lower side of the connector.

3) Plug the KSTU **P508** female connector into the **P8** male connector on the motherboard.

4) Secure the KSTU to the standoffs with the two provided screws.

6.30 KSTU Wiring

6.31 Refer to Base Unit Wiring in Section **100-816-208** for KSTU wiring.

6.32 The KSTU must be connected to a OL13A (or equivalent) type lines for off-premises stations. (300 ohms loop resistance max., including the telephone or other devices DC off hook resistance.

6.40 KSTU Programming Overview

6.41 The following parameters may be specified for the KSTU:

Program 03
- Specify code 31 for KSTU slot.

Program 31
- Used to configure all KSTU ports connected to voice mail (see Chapter **7** for voice mail installation).

Program 10-2
- Used to set standard telephone ringing option.
- Not required for Background Music (BGM) connection.

Program 19
- Used for BGM connection to KSTU Port 11.

NOTE:
KSTU Ports (08~11) are fixed. They are assigned even if a KSTU is not installed.

7 DIGITAL TELEPHONE INTERFACE UNIT (PDKU)

7.00 General

7.01 The Digital Telephone Interface Unit (PDKU) provides eight ports/circuits for digital telephones and it can only be installed in the Expansion Unit. The PDKU can also support Integrated Data Interface Units (PDIU-DIs/PDIU-DI2s), Stand-alone Data Interface Units (PDIU-DSs), a Digital Door Phone/ Lock Control Unit (DDCB), a Digital Direct Station Selection Console (DDSS), and Add-on Modules (ADMs). The DDSS console, DDCB, and PDIU-DSs are wired directly to the PDKU and require no additional hardware, but do require their own dedicated ports/circuits. The PDIU-DI/PDIU-DI2 or the ADM shares with its accompanying digital tele-

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phone the same wire pair and circuit on the PDKU. The PDKU (Figure 5-12) has no controls.

NOTE:
The PDIU-DI attaches to 1000-series Digital Telephones, and the PDIU-DI2 attaches to 2000-series Digital Telephones.

7.10 PDKU Hardware Options

7.11 The PDKU supports the hardware options noted below. Unlike the other PCBs, there are no controls on the PDKU that need to be set for options.

Internal option:

- none

External option:

- DDSS console
- PDIU-DS
- PDIU-DI/PDIU-DI2
- DDCB

NOTE:
*There are two versions of the PDKU: PDKU1, and PDKU2. These versions are identical except for the number of Data Interface Units (DIUs) they can support (see Paragraphs **7.14** and **7.15)**. Also, PDKU2 supports continuous DTMF tones with 2000-series digital telephones, but PDKU1 does not support continuous DTMF tones.*

7.12 Hardware Configuration

7.13 DDSS Console Configuration. Refer to Station Apparatus Installation, Section **100-816-206**, for installation procedures for the DDSS console. The DDSS console requires dedicated use of Circuit 8 of the PDKU.

7.14 PDIU-DS Configuration. Refer to Peripherals Installation, Section **100-816-207**, for installation procedures for the PDIU-DS. A PDIU-DS can be connected to Circuits 1 ~ 7 on a PDKU1 or

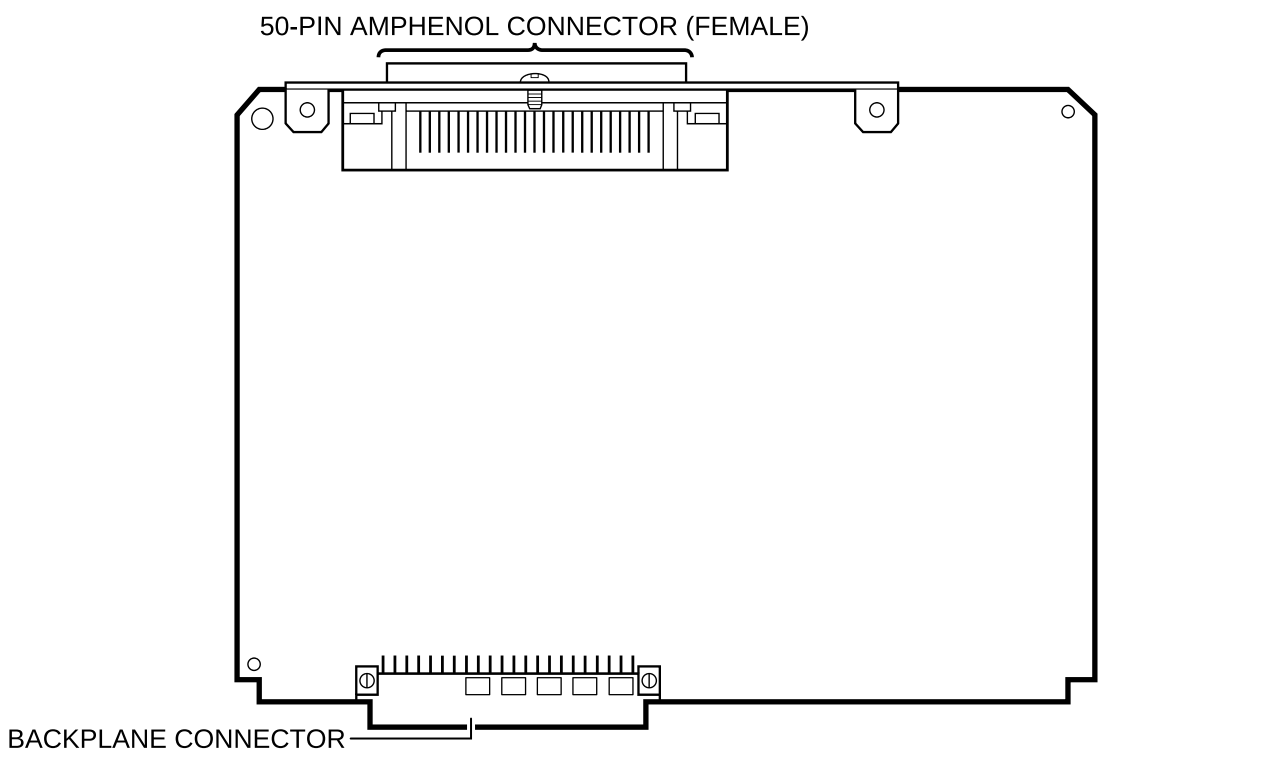


FIGURE 5-12
PDKU INTERFACE CONNECTION

Circuits 1 ~ 8 on a PDKU2; the circuit must be dedicated to the PDIU-DS.

7.15 PDIU-DI/PDIU-DI2 Configuration. Refer to Station Apparatus Installation, Section **100-816-206**, and Peripherals Installation, Chapter **7**, for installation procedures for the PDIU-DI/PDIU-DI2. PDIU-DIs/PDIU-DI2s can be equipped with any digital telephone connected to PDKU Circuits 1 ~ 7 with PDKU1 or Circuits 1 ~ 8 with PDKU2.

7.16 DDCB Configuration. Refer to Peripherals Installation, Section **100-816-207**, for installation procedures for the DDCB. The DDCB must be connected to the Circuit 8 on the PDKU.

7.17 ADM Configuration. Refer to Section **100-816-206,** Paragraph **7.00.**

7.20 PDKU Installation Procedure

7.21 Install the PDKU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Insert the PDKU into the appropriate slot (see Paragraph **5.22**, and apply firm, even pressure to ensure proper mating of connectors.

NOTE:
Ensure the PDKU's component side is facing right when installing it in the KSU.

4) After installing the PDKU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

7.30 PDKU Wiring

7.31 Refer to PDKU Wiring Diagrams, Chapter **8**, for wiring/interconnecting details.

7.40 PDKU Programming Overview

7.41 The following parameters may be specified, through programming, for the PDKU:

Program 03
- Specify code 61 if no options are installed on a PDKU.
- Specify code 62 to indicate a PDKU that will support stations that must receive Off-hook Call Announce (OCA).
- Specify code 64 to indicate a PDKU configured for a DDSS console and OCA.

Programs 20, 21, and 22
- Use to configure PDIU-DIs/PDIU-DI2s and PDIU-DSs.

Programs 28 and 29
- Use for DDSS assignments.

Program 30
- Adjusts initial off-hook volume level for digital telephone handsets.

Program 92-5
- Initializes initial ringing, speaker, and muted ring volume levels of digital telephones.

Programs 77-1, 77-2, and 79
- Used for DDCB and door phone assignments

8 ELECTRONIC TELEPHONE INTERFACE UNIT (PEKU)

8.00 General

8.01 The Electronic Telephone Interface Unit (PEKU) provides eight ports for electronic telephones and it must be installed in the Expansion Unit. It is recommended that the current 6500-series be used, because this series consumes the least amount of power.

8.02 The PEKU can be configured to receive Off-hook Call Announce (OCA) by installing an Off-hook Call Announce Unit (EOCU). It can also be configured to support an HDSS console and an external Background Music (BGM) source connector. An external amplifier for two-CO line conference calls can also be connected to Circuits 6 and 7 of the PEKU. The HDSS console, the external amplifier, and the BGM source, are wired directly to the PEKU and require no additional hardware, but do require specific ports/circuits. Electronic telephones also wire directly to the PEKU, and they can be connected to any PEKU circuit.

8.03 PEKU controls and interface connectors are shown in Figure 5-13 and described in Table 5-B.

8.10 PEKU Hardware Options

8.11 The PEKU supports the following hardware options:

Internal Options
- Off-hook Call Announce Unit (EOCU)

External Options

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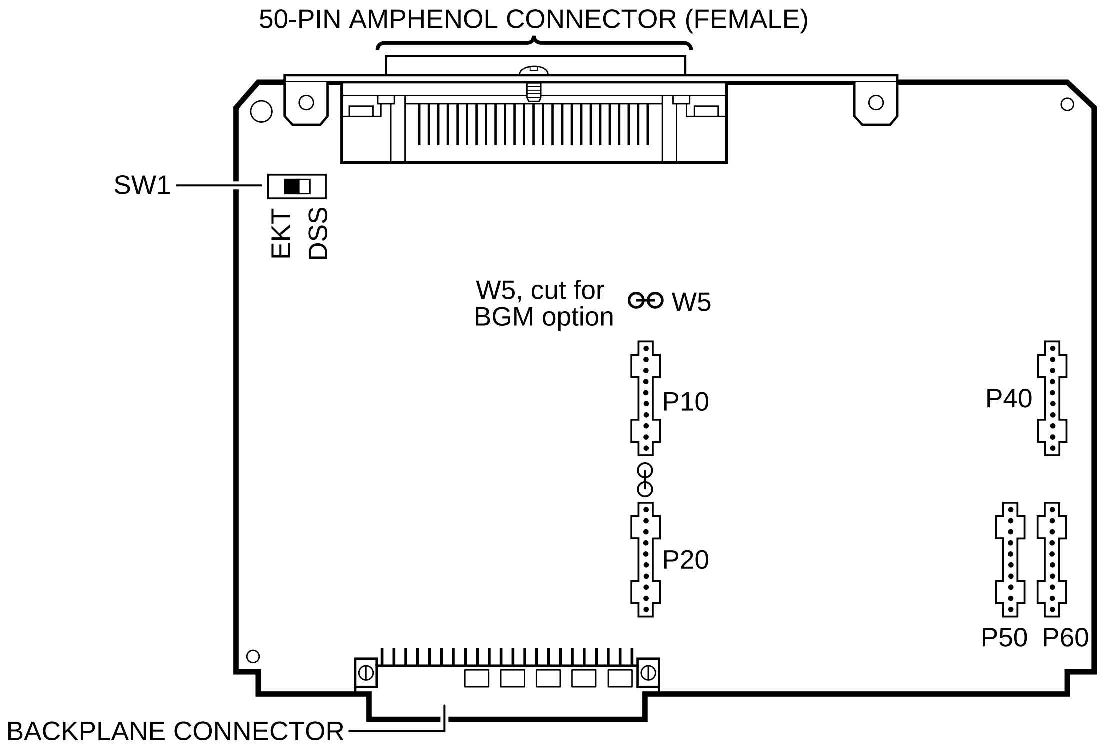


FIGURE 5-13
PEKU CONTROLS AND INTERFACE CONNECTORS

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- HDSS console
- BGM source connection
- External Amplifier

8.12 Off-hook Call Announce (EOCU) Installation. Install the Off-hook Call Announce Unit (EOCU) in accordance with the following steps:

1) Remove the PCB from its protective packaging.

NOTE:
*PEKU connectors **P10**, **P20**, **P40**, **P50,** and **P60** are positioned to allow installation of the EOCU only in the proper position (Figure 5-13).*

2) Mate EOCU connectors **J10**, **J20**, **J40, J50**, and **J60** with PEKU connectors **P10, P20**, **P40**, **P50**, and **P60** (Figure 5-14).

3) Apply firm, even pressure to EOCU to ensure proper mating of connectors.

4) Use a 3-pair cable for making connections between the PEKU and the Off-hook Call Announce (OCA) electronic telephone. Refer to Wiring Diagrams, Section **100-816-208**, for wiring/interconnecting details.

5) Refer to Station Apparatus Installation, Section **100-816-206**, for procedures to upgrade electronic telephones for OCA.

8.13 HDSS Console Configuration. Configure the PEKU to support an HDSS console in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Set the **SW1 DSS/EKT** switch to **DSS.**

3) Refer to Station Apparatus Installation, Section **100-816-206**, for installation procedures for the HDSS console. The HDSS console requires dedicated use of Circuits 7 and 8 of the PEKU PCB.

TABLE 5-B
PEKU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-13)	TYPE OF COMPONENT	DESCRIPTION
Off-hook Call Announce P10	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P20, P40, P50, and P60).
Off-hook Call Announce P20	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P40, P50, and P60).
Off-hook Call Announce P40	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P50, and P60).
Off-hook Call Announce P50	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P60).
Off-hook Call Announce P60	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P50).
DSS/EKT DSS Console/ Electronic Telephone SW1 Switch	Two-position slide switch	Configures PEKU for operation with either an HDSS console or electronic telephones.
BGM source connection W5 Jumper Wire	White jumper wire	When cut, configures PEKU for BGM source connection.

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8.14 Background Music (BGM) Configuration. Configure the PEKU to support a BGM source in accordance with the following steps:

1) Remove the PCB from its protective packaging.
2) Cut the **W5** (BGM) jumper wire on the PEKU PCB.
3) Refer to Peripherals Installation, Section **100-816-207,** for installation procedures for BGM connection.

8.15 External Amplifier Configuration. The PEKU does not have to be configured to support an external amplifier. However, the system must be programmed for one; see Paragraph **8.40**. See Peripherals Installation, Section **100-816-207**, for external amplifier installation instructions.

8.20 PEKU Installation Procedure

8.21 Install the PEKU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

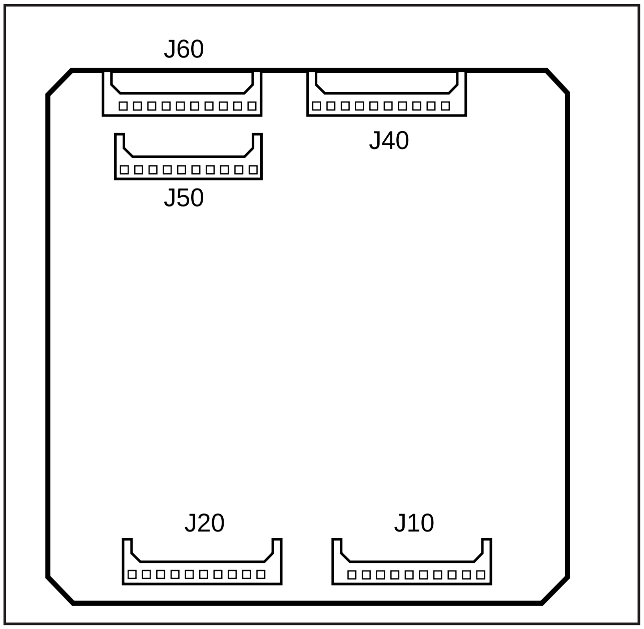


FIGURE 5-14
OFF-HOOK CALL ANNOUNCE UNIT (EOCU) INTERFACE CONNECTORS

2) Ensure the PEKU has been configured for the appropriate hardware options (refer to Paragraph **8.10**).

3) Insert the PEKU into the appropriate slot (refer to Paragraph **5.22**), and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PEKU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

8.30 PEKU Wiring

8.31 Refer to PEKU Wiring Diagrams, Section **100-816-208,** for wiring/interconnecting details.

8.40 PEKU Programming Overview

8.41 The following parameters may be specified, through programming, for the PEKU:

Program 03

- Specify code 21 to indicate a station line PEKU.
- Specify code 22 to indicate a PEKU configured for OCA.
- Specify code 23 to indicate a PEKU configured for an HDSS console.
- Specify code 24 to indicate a PEKU configured for OCA and an HDSS console.

Program 10-2

- Used for BGM connection.

Program 10-3

- Used for external amplifier connection.

Program 19

- Also used for BGM connection.

Programs 28 and 29

- Used for HDSS assignments.

9 STANDARD TELEPHONE INTERFACE UNIT (PSTU)

9.00 General

9.01 The Standard Telephone Interface Unit (PSTU) provides an interface between standard telephones or two-wire devices and the system, and it must be installed in the Expansion Unit. The PSTU PCB adds eight standard telephone lines to the system. The PSTU can also support a Background Music (BGM) source.

NOTE:
For the system to recognize the Dual-Tone Multi-Frequency (DTMF) tones generated by a standard telephone (or any other device connected to a PSTU port), a DTMF Receiver Unit (K4RCU) must be installed in the Base Unit.

9.02 PSTU controls are shown in Figure 5-15 and described in Table 5-C.

9.10 PSTU (1 and 2) Hardware Options

9.11 There are two PSTU versions (1 and 2): They are identical except for the ring generator. The ring generator on the original version (**V.3**) of PSTU1 is fixed at a 190V P-P level, while the ring generator on PSTU1 (**V.4**) and PSTU2 can be set for 130V P-P or 190V P-P. The **W1** jumper plug is used to set the voltage level. Most standard telephones and two-wire devices require the 190V P-P level; however, some devices may experience ring-trip with 190V P-P and they require the 130V P-P level.

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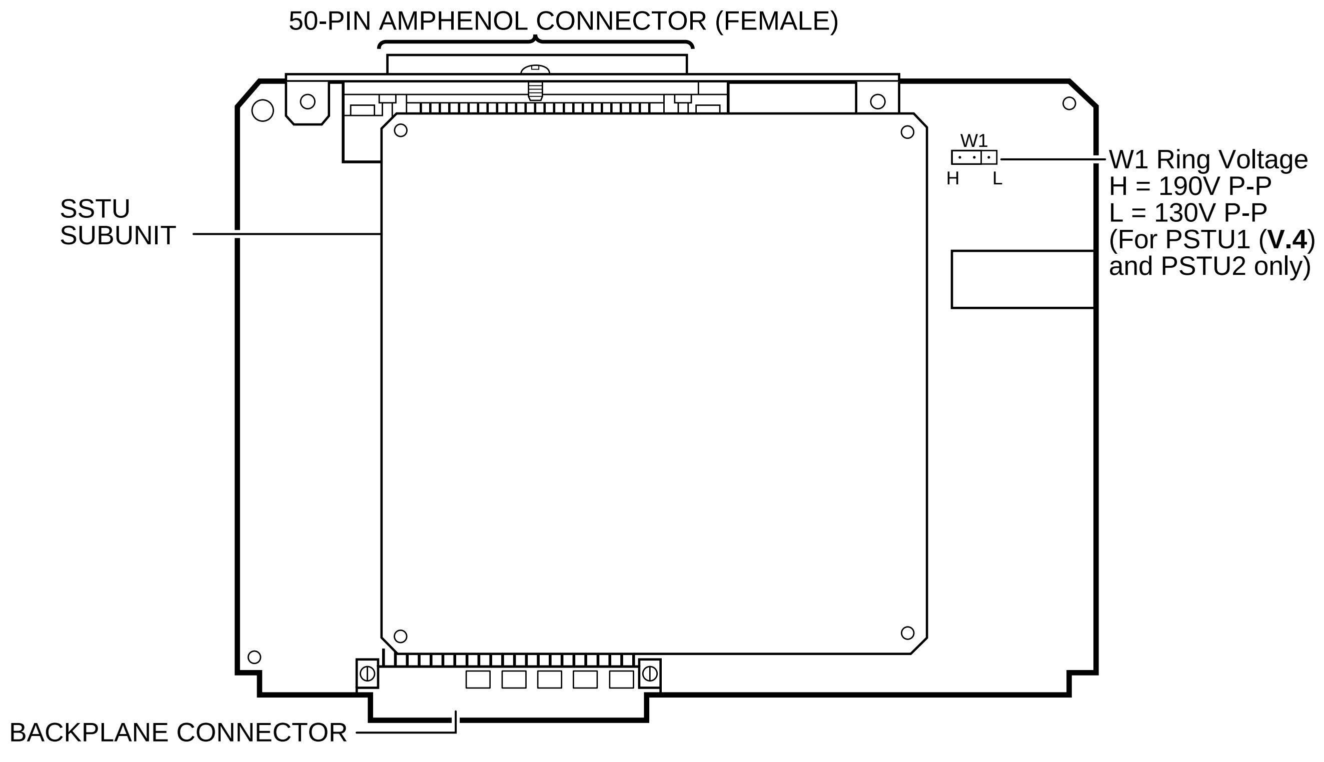


FIGURE 5-15
PSTU AND SUBUNIT (SSTU)

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TABLE 5-C
PSTU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-15)	TYPE OF COMPONENT	DESCRIPTION
Ring Voltage W1 Jumper Plug (PSTU1 (**V.4**) and PSTU2 only)	Three-terminal jumper	Sets ring generator voltage level for all circuits. H = 190V P-P L = 130V P-P

NOTE:
*PSTU1 (**V.4**) became available in November 1989. PSTU1(**V.3**) was discontinued.*

9.12 Set the PSTU1 (**V.4**) or PSTU2 ring generator level as required:

- **W1** set to H (190V P-P).
- **W1** set to L (130V P-P).
- Two ringers maximum per port (H or L).

9.13 Unlike the PEKU or PESU, the PSTU does not have to be configured for BGM: There is no jumper wire to cut, etc.

9.20 PSTU Installation Procedure

9.21 Install the PSTU in accordance with the following steps:

1) Remove the PCB from its protective packaging. The protective shield on the back of the PSTU is designed to protect the installer from

potentially hazardous ring voltage. Do not remove this shield.

2) Ensure that the PSTU subunit (SSTU) is securely attached to the PSTU (refer to Figure 5-15).

NOTE:

***W1**, the ring generator level option, should be set in the H position (factory) for initial installation.*

3) Insert the PSTU into the appropriate slot (refer to Paragraph **5.22**), and apply firm, even pressure to ensure proper mating of connectors.

9.30 PSTU Wiring

9.31 Refer to PSTU Wiring Diagram, Section **100-816-208**, for wiring/interconnecting details.

9.32 The PSTU is registered for use with OL13A type lines for off-premises stations.

9.40 PSTU Programming Overview

9.41 The following parameters may be specified, through programming, for the PSTU:

Program 03

- Specify code 31 for all slots that have PSTUs installed.

Program 31

- Used to configure all PSTU ports connected to voice mail (Section **100-816-207** for more details).

Program 10-2

- Used to set standard telephone ringing option.
- Also used for BGM connection.

Program 19

- Used for BGM connection also.

10 STANDARD/ELECTRONIC TELEPHONE INTERFACE UNIT (PESU)

10.00 General

10.01 The Standard/Electronic Telephone Interface Unit (PESU) provides two standard telephone interface circuits (1 and 2) identical to PSTU circuits for connection between standard telephones, or two-wire devices, and the system. It also provides four electronic telephone interface circuits (5 ~ 8) identical to PEKU circuits for connecting electronic telephones, BGM or an external amplifier. The PESU provides a ring generator for circuits 1 and 2 (with a ring voltage of either 190V P-P or 130V P-P), and it must be installed in the Expansion Unit.

- The PESU does not support an HDSS console connection.
- The PESU provides connectors to mount the EOCU for OCA to electronic telephones.

NOTE:
A KSU must be installed in the Base Unit for the system to recognize Dual-Tone Multi-Frequency (DTMF) tones sent from standard telephones or other two-wire devices that are connected to the PESU.

10.02 The PESU controls and interface connectors are shown in Figure 5-16 and described in Table 5-D.

10.10 PESU Hardware Options

10.11 The PESU supports the following hardware options:

- **Internal option:** Off-hook Call Announce (EOCU).

NOTE:
*Refer to Section **100-816-206** and Section **100-816-207** for installation of external options.*

10.12 Off-hook Call Announce (EOCU) Installation. Install the Off-hook Call Announce in accordance with the following steps:

1) Remove the PCB from its protective packaging.

NOTE:
*PESU connectors **P10**, **P20**, **P40**, **P50**, and **P60** are positioned to allow installation of the EOCU only in the proper position (refer to Figure 5-16).*

2) Mate the EOCU connectors **J10**, **J20**, **J40**, **J50**, and **J60** with the PESU connectors **P10**, **P20**, **P40**, **P50**, and **P60** (refer to Figure 5-16).

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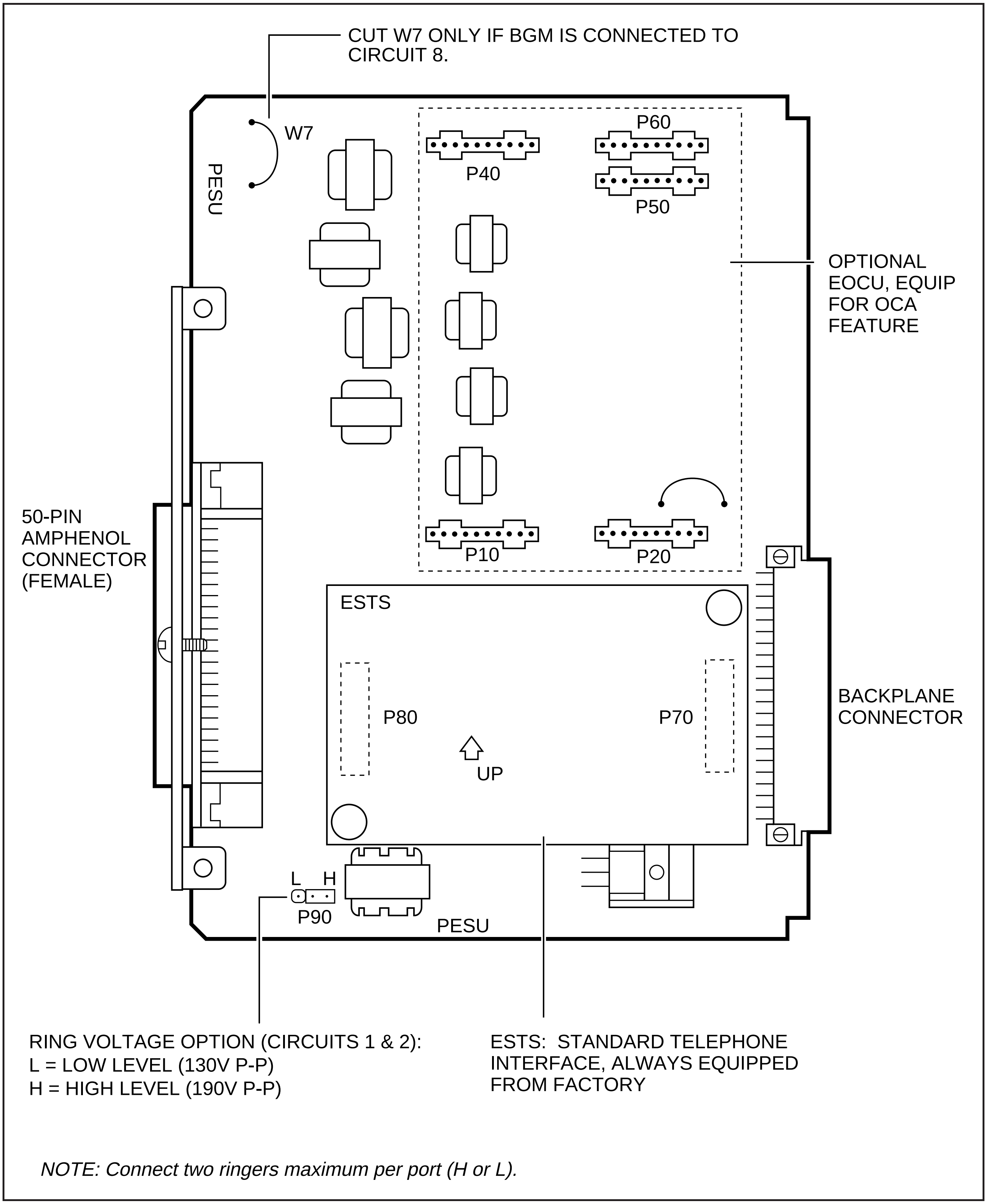


FIGURE 5-16
PESU PCB OPTION LOCATION AND IDENTIFICATION

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TABLE 5-D
PESU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-16)	TYPE OF COMPONENT	DESCRIPTION
Off-hook Call Announce P10	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P20, P40, P50, and P60).
Off-hook Call Announce P20	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P40, P50, and P60).
Off-hook Call Announce P40	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P50, and P60).
Off-hook Call Announce P50	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P60).
Off-hook Call Announce P60	10-pin connector	Interface connector for optional Off-hook Call Announce subassembly connector (used in conjunction with P10, P20, P40, and P50).
Ring Voltage Jumper Plug P90	Three-terminal jumper	Sets ring generator voltage level for circuits 1 and 2. H = 190V P-P (factory setting) L = 130V P-P
BGM W7 Jumper Pack	White jumper wire	When cut, configures PESU, circuit 8, for BGM source connection.

3) Apply firm, even pressure to the EOCU to ensure proper mating of connectors.

4) Use 3-pair cable for connecting the PESU and the OCA electronic telephone (refer to Wiring Diagrams, Section **100-816-208**, for wiring/ interconnecting details).

5) Refer to Station Apparatus Installation, Section **100-816-206,** for procedures to add OCA to electronic telephones.

10.13 Background Music (BGM) Configuration. Configure the PESU to support a BGM source in accordance with the following steps:

1) Remove the PCB from its protective packaging.
2) Cut the W7 (BGM) jumper wire on the PESU PCB.
3) Refer to Peripherals Installation, Section **100-816-207**, for BGM installation procedures.

10.14 External Amplifier Configuration. The PESU does not have to be configured to support an

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external amplifier. However, the system must be programmed for one; see Paragraph **10.40**. The external amplifier requires Circuits 6 and 7 on the PESU. See Peripherals Installation, Section **100-816-207**, for external amplifier installation instructions.

10.20 PESU Installation Procedure

10.21 Install the PESU in accordance with the following steps:

1) Remove the PCB from its protective packaging. The protective shield on the back of the PESU is designed to protect the installer from potentially hazardous ring voltage. Do not remove this shield.

2) Ensure that the PESU subunit (ESTS) is securely attached to the PESU (refer to Figure 5-15).

3) If the electronic telephones connected to the PESU must receive OCA calls, install the EOCU subassembly PCB on the PESU per Paragraph **10.12.**

4) If a BGM source is connected to the PESU, Circuit 8, cut **W7**.

5) Ensure that the ring voltage option, **P90**, is set to the "H" position for initial installation. The "L" position is used if devices connected to the PESU trip ring voltage before answer.

6) Insert the PESU into the appropriate slot, and apply firm, even pressure to ensure proper mating of connectors.

7) After installing the PESU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

10.30 PESU Wiring

10.31 Refer to PESU Wiring Diagram, Section **100-816-208,** for wiring/interconnecting details.

10.40 PESU Programming Overview

10.41 The following parameters may be specified, through programming, for the PESU:

Program 03
- Specify code 25 for all slots that have PESUs without EOCU.
- Specify code 26 for all slots that have PESUs equipped with EOCU.

NOTE:
A special code is not required to connect BGM to a PESU.

Program 31
- Configures the PESU Circuits 1 and 2 for connection to voice mail devices.

Program 10-2
- Sets the standard telephone ring cadence for normal or distinctive ringing and BGM source connection.

Program 10-3
- Used for external amplifier connection.

Program 19
- Also used for BGM connection.

11 CO LINE UNIT (PCOU)

11.00 General

11.01 The PCOU PCB adds four CO lines to the system and it can only be installed in the Expansion Unit. The PCOU provides Ring Detection, Dial Outpulsing and Hold; as well as Automatic Busy Redial (ABR) circuitry. Each CO line can be programmed for Dual-Tone Multi-Frequency (DTMF) or dial pulse.

NOTE:
There are two PCOU versions (1 and 2). They are identical in fit/form/function and are interchangeable in all DK system models.

11.02 PCOU controls, indicators, and interface connectors are shown in Figure 5-17 and described in Table 5-E.

11.10 PCOU Hardware Options

11.11 There are no hardware options supported by the PCOU.

11.20 PCOU Installation Procedure

11.21 Install the PCOU in accordance with the following steps:

1) Remove the PCB from its protective packaging.

NOTE:
*The dB **PAD** switches **SW101** through **SW401** control excessive loudness resulting from close proximity to the CO or PBX telephone office by providing a 3 decibel (dB) signal level drop to, or from, the PBX or CO when set to the **3** position. Switches are factory-set to the **0** (0 dB signal level drop) position.*

2) If the Expansion Unit is located within one mile of the PBX or CO telephone office, set dB **PAD** switches **SW101** through **SW401** to the **3** (-3 dB signal level drop) position.

3) Insert the PCOU into the appropriate slot (refer to Paragraph **2.22**), and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PCOU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

11.30 PCOU Wiring

11.31 Refer to PCOU Wiring Diagram, Section **100-816-208**, for wiring/interconnecting details.

11.40 PCOU Programming Overview

11.41 The following parameters may be specified, through programming, for the PCOU:

Program 03
- Specify code 11 for the slot in which the PCOU is installed.

Program 10-1
- Allows/denies two-CO Line Conference and Direct Inward System Access (DISA).

Program 15
- Assigns DTMF/Dial Pulse (DP) Dialing, Tenant Service, DISA, and other attributes to each CO line.

Program 16
- Assigns CO lines to groups 81 ~ 88, and dial 9 group.

Program 40
- Assigns stations access to CO lines (incoming and outgoing access).

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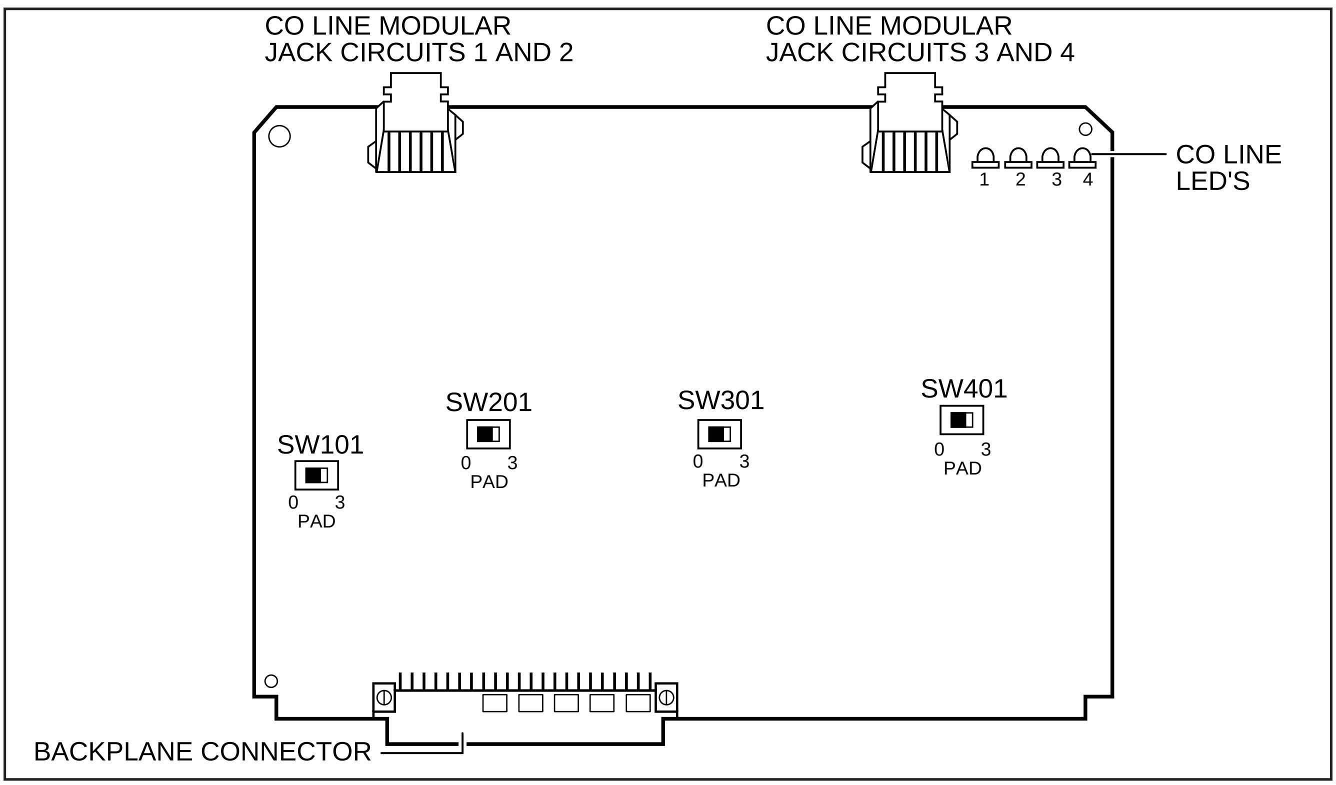


FIGURE 5-17
PCOU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

TABLE 5-E
PCOU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-17)	TYPE OF COMPONENT	DESCRIPTION
CO Line Circuit 1 Indicator CD112	Red LED	Lights to indicate CO line circuit 1 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
CO Line Circuit 2 Indicator CD212	Red LED	Lights to indicate CO line circuit 2 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
CO Line Circuit 3 Indicator CD312	Red LED	Lights to indicate CO line circuit 3 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
CO Line Circuit 4 Indicator CD412	Red LED	Lights to indicate CO line circuit 4 is in operation (NOTE: CO line indicator will not light unless PCOU is connected to a CO).
J1 Connector	Modular connector	Interface connector for CO line circuits 1 and 2.
J2 Connector	Modular connector	Interface connector for CO line circuits 3 and 4.
PAD Switch SW101	Two-position slide	Enables 3dB signal level drop for CO line circuit 1.
PAD Switch SW201	Two-position slide	Enables 3dB signal level drop for CO line circuit 2.
PAD Switch SW301	Two-position slide	Enables 3dB signal level drop for CO line circuit 3.
PAD Switch SW401	Two-position slide	Enables 3dB signal level drop for CO line circuit 4.

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Program 41
- Assigns stations access to CO lines (outgoing only).

Program 42-0, 1-8
- Assigns behind PBX/CENTREX operation to each CO line.

Programs 45 ~ 48
- Defines Toll Restrictions for any CO line.

Programs 50 ~ 56
- Defines Least Cost Routing using CO lines.

Program 78
- Assigns special ringing of CO lines: Night Ring Over Page, DISA, IMDU.

Programs 81 ~ 89
- Assigns CO lines to ring selected stations.
- Assigns Delayed Ringing to any CO line.

Program 93
- Assigns names to CO lines.

12 OPTION INTERFACE UNIT (PIOU AND PIOUS)

12.00 General

12.01 The Option Interface Unit (PIOU or PIOUS) provides a circuit interface with peripheral options. A maximum of one PIOU or PIOUS PCB can be installed in the system. The PIOU and PIOUS support the same options, except the PIOUS does not support Zone Paging (see Paragraph **12.11**).

12.02 PIOU controls, indicators, and interface connectors are shown in Figure 5-18 and described in Table 5-F. PIOUS information is provided in Figure 5-19 and Table 5-G.

12.03 The internal 600 ohm or 3 watt page amplifier of the PIOU is not supported by Strata DK16.

12.10 PIOU and PIOUS Hardware Options

12.11 The PIOU and PIOUS support the following STRATA DK16 hardware options:

Internal Options
- Remote Maintenance Modem Unit (IMDU)

External Options
- Alarm Sensor
- Local Maintenance Terminal or Modem
- SMDR Printer or Call Accounting Port
- Remote Maintenance Port
- Relay control options
- Zone Page via relays (PIOU only)

> *NOTE:*
> *Refer to Peripheral Equipment Installation, Section* ***100-816-207****, for installation of external options.*

12.12 Remote Maintenance Modem Unit (IMDU) Installation. Install the Remote Maintenance Modem Unit (IMDU) in accordance with the following steps:

1) Remove the PCB from its protective packaging.

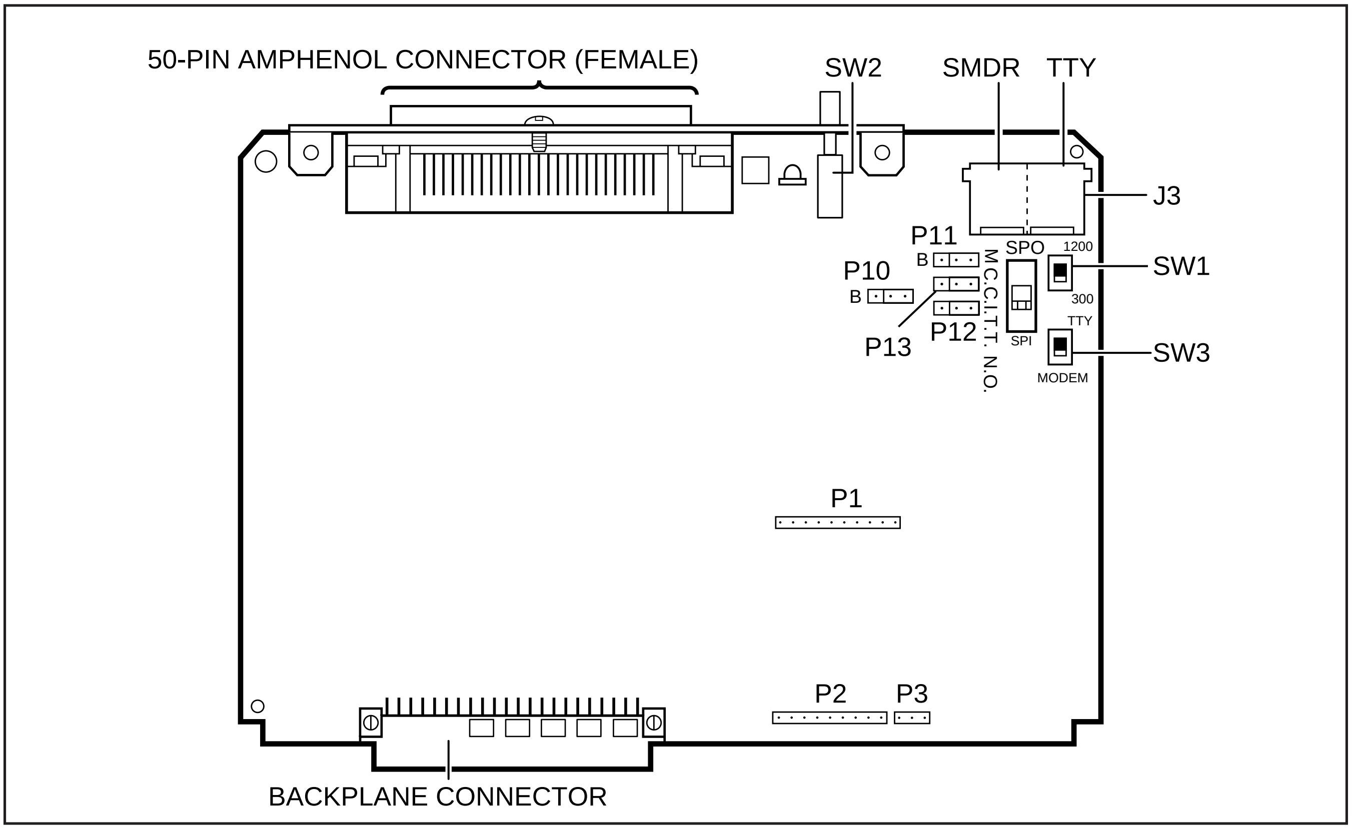


FIGURE 5-18
PIOU CONTROLS, INDICATORS, AND INTERFACE CONNECTORS

TABLE 5-F
PIOU CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-18)	TYPE OF COMPONENT	DESCRIPTION
SMDR/TTY Interface Connector J3	Dual modular connector	Interface connector for SMDR printer/ call accounting device and maintenance terminal/modem.
IMDU Connector P1	10-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P2	9-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P3	3-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
M/B Make/Break Jumper Plug P10	Three-terminal jumper plug	External Page/Door Lock Control Relay MAKE or BREAK jumper plug.
M/B Make/Break Jumper Plug P11	Three-terminal jumper plug	Night/Hold Relay MAKE or BREAK jumper plug.
Alarm Sensor N.O./N.C. Jumper Plug P12	Three-terminal jumper plug	Alarm sensor normally open or normally closed jumper plug.
CCITT/BELL Jumper Plug P13	Three-terminal jumper plug	IMDU or external modem operating specification jumper plug.
SMDR Baud Rate Switch SW1	Two-position slide switch	Selects baud rate (300 or 1200 bps) for SMDR printer or call accounting device.
TTY Baud Rate Switch SW2	Two-position locking push-button switch	Selects baud rate (300 or 1200 bps) for Remote Maintenance Modem piggy-back module (IMDU) or external TTY jack.
Modem/TTY Switch SW3	Two-position slide switch	Enables PIOU for operation with IMDU modem or TTY jack.

2) Set the **SW2** baud rate switch on the front panel to **300** or **1200,** as appropriate, after the PIOU/PIOUS has been installed in the Expansion Unit (in-300 bps—out-1200 bps).

3) Set **SW3** to MODEM position for IMDU operation.

4) Set the **P13** jumper plug on the PIOU to the BELL position; or, cut the **W4** jumper on the PIOUS for BELL operation.

5) Mate IMDU connectors **J1, J2,** and **J3** with PIOU or PIOUS connectors **P1, P2,** and **P3** (refer to Figure 5-20).

NOTE:
*PIOU or PIOUS connectors **P1, P2,** and **P3** are positioned to allow installation of the IMDU only in the proper position.*

6) Apply firm, even pressure to IMDU to ensure proper mating of connectors.

NOTE:
The IMDU default station intercom number is 619; and IMDU communication parameters are 7-bits, even parity, 1-stop bit.

7) Refer to Programming Procedures, Section **100-816-300**, **Program 77-1**, and set LED 14 to ON to enable IMDU operation.

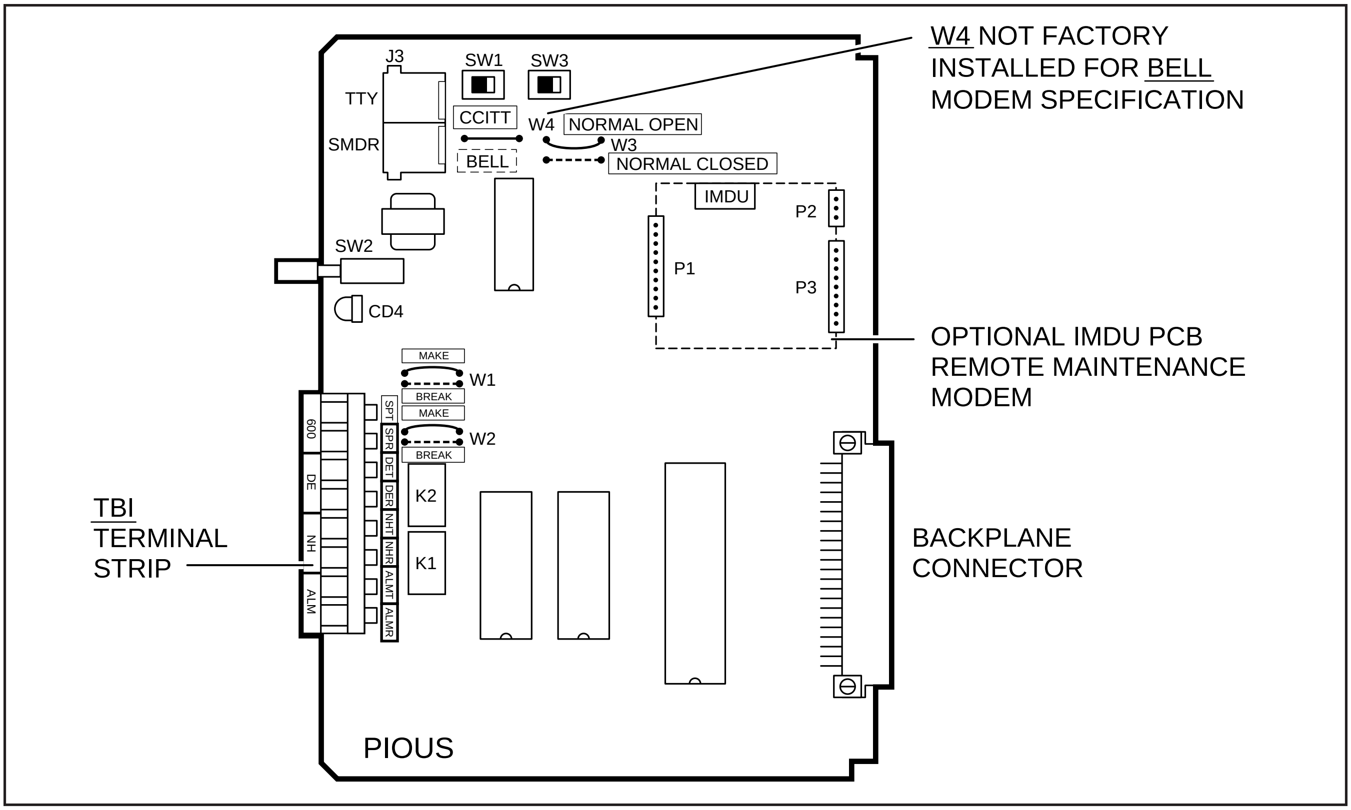


FIGURE 5-19
PIOUS PCB SWITCH/JUMPER, OPTION LOCATION

> *NOTE:*
> *Refer to Remote Maintenance Procedures, Section **100-816-600**, for information regarding the IMDU.*

12.20 PIOU and PIOUS Installation Procedure

12.21 Install the PIOU or PIOUS in accordance with the following steps:

1) Remove the PCB from its protective packaging.

2) Ensure the PIOU or PIOUS has been configured for the appropriate hardware options (refer to Paragraph **12.10** and Section **100-816-207**).

3) Insert the PIOU or PIOUS into slot 06 in the Expansion Unit, and apply firm, even pressure to ensure proper mating of connectors.

4) After installing the PIOU or PIOUS, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

12.30 PIOU and PIOUS Wiring

12.31 Refer to Peripheral Equipment Installation (Section **100-816-207**) and Wiring Diagrams (Section **100-816-208**) for PIOU/PIOUS wiring/interconnecting details.

12.40 PIOU and PIOUS Programming Overview

12.41 The following parameters may be specified, through programming, for the PIOU and PIOUS:

Program 77-1
- Assigns relay control and IMDU options.

Program 60
- Assigns SMDR options.

Program 78
- Enables Night Ringing over External Page.

TABLE 5-G
PIOUS CONTROLS AND INTERFACE CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-19)	TYPE OF COMPONENT	DESCRIPTION
SMDR/TTY Interface Connector J3	Dual modular connector	Interface connector for SMDR printer/ call accounting device and maintenance terminal/modem.
IMDU Connector P1	10-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P2	9-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
IMDU Connector P3	3-pin connector	Interface connector for Remote Maintenance Modem piggy-back module.
M/B Make/Break Jumper W1	Wire jumper	External Page/Door Lock Control Relay MAKE or BREAK jumper.
M/B Make/Break Jumper W2	Wire jumper	Night/Hold Relay MAKE or BREAK jumper.
Alarm Sensor N.O./N.C. W3	Wire jumper	Alarm sensor normally open or normally closed jumper.
CCITT/BELL Jumper W4*	Wire jumper	IMDU or external modem operating specification jumper plug. (BELL = NO W4)
SMDR Baud Rate Switch SW1	Two-position slide switch	Selects baud rate (300 or 1200 bps) for SMDR printer or call accounting device.
TTY Baud Rate Switch SW2	Two-position locking push-button switch	Selects baud rate (300 or 1200 bps) for Remote Maintenance Modem piggy-back module (IMDU) or external TTY jack.
Modem/TTY Switch SW3	Two-position slide switch	Enables PIOUS for operation with IMDU modem or TTY jack.

*Most modems in USA require BELL specification: W4 not factory-installed.

13 CO LINE/DIGITAL TELEPHONE INTERFACE UNIT (KCDU)

13.00 General

13.01 The KCDU, which can only be installed in the Expansion Unit of DK16 (it will not function in DK24/56/96), has two loop start CO line circuits and four digital telephone circuits. The KCDU digital telephone circuits can support all but one of the devices supported by either the PDKU or Base Unit integrated digital telephone circuits: digital telephones, PDIU-DIs/PDIU-D12s, PDIU-DSs, ADMs, and a DDCB. The KCDU does not support a DDSS console. One or two KCDU PCBs may be installed in the Expansion Unit. No other station or CO line PCB can be installed if the KCDU is installed.

13.02 The KCDU is shown is Figure 5-21, and its controls, connectors, and indicators are described in Table 5-H.

13.10 KCDU Configuration

13.11 The KCDU may have to be configured to control excessive loudness if the system is close to

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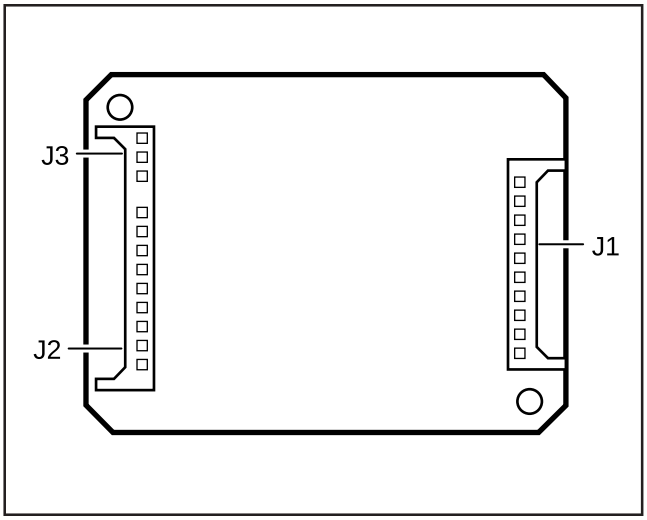


FIGURE 5-20
REMOTE MAINTENANCE MODEM UNIT (IMDU) IINTERFACE CONNECTORS

a CO or installed behind a PBX telephone system. It does not have to be configured for anything else. The decibel (db) PAD switches, **SW501** (CO1) and **SW601** (CO2), control the loudness by providing a 3 db signal level drop to, or from, the PBX or CO when set to the PAD position. The switch comes from the factory set at NOR (for normal) meaning no PAD loss.

13.20 KCDU Installation Procedure

13.21 Install the KCDU in accordance with the following steps:

1) Remove the PCB from its protective packaging.
2) If the system is located within one mile of the CO or PBX telephone system, set db **PAD** switches **SW501** and **SW601** to the PAD position.
3) Insert the KCDU into the appropriate slot (04 first, 05 second) in the Expansion Unit, and apply firm, even pressure to ensure proper mating of the connectors.

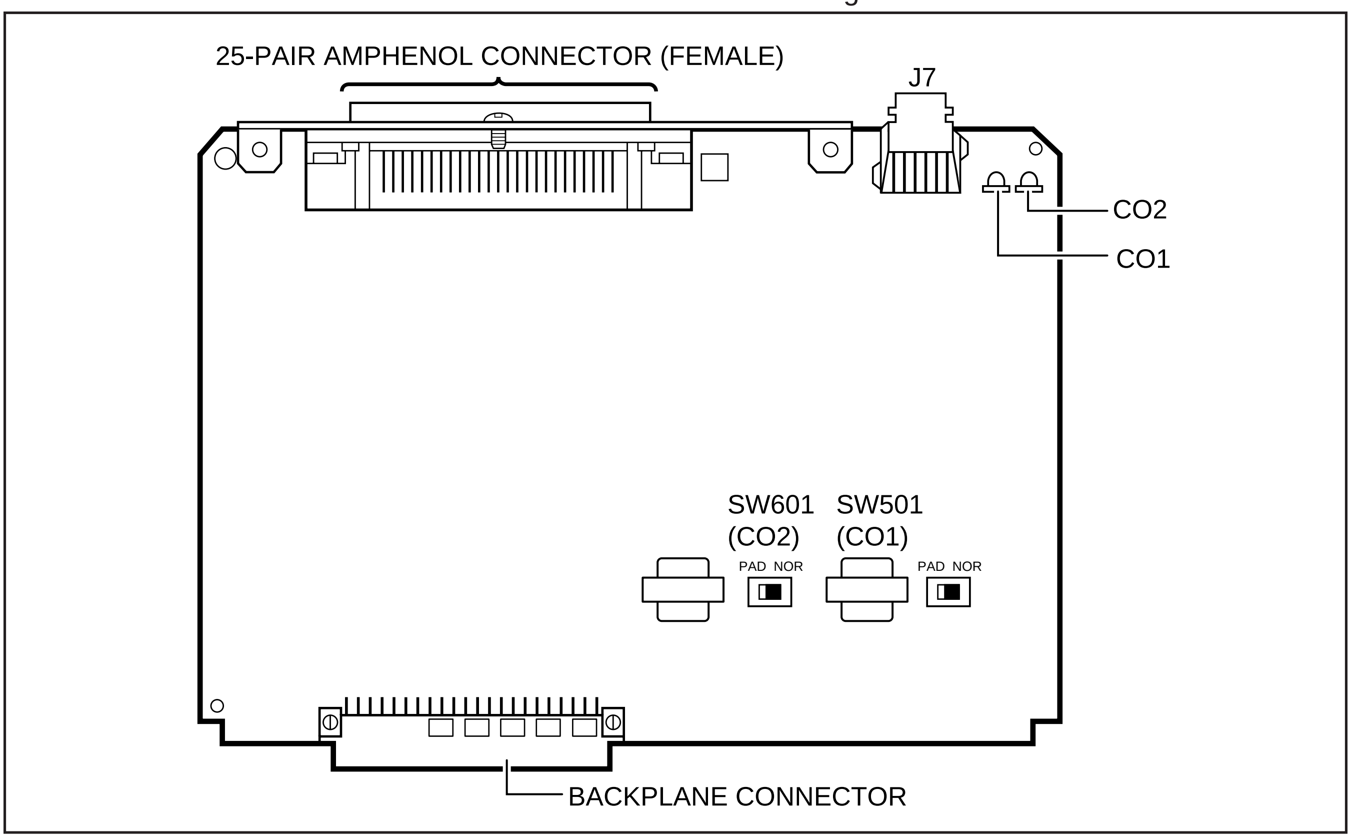


FIGURE 5-21
KCDU INDICATORS, OPTIONS, AND CONNECTORS

TABLE 5-H
KCDU CONTROLS, INDICATORS, AND CONNECTORS

CONTROL/INDICATOR/ CONNECTOR (Figure 5-21)	TYPE OF COMPONENT	DESCRIPTION
CO line circuit 1 Indicator CD517	Red LED	Lights to indicate CO line circuit 1 is in operation.
CO line circuit 2 Indicator CD617	Red LED	Lights to indicate CO line circuit 2 is in operation.
J7 Connectors	Modular connector	Interface connector for CO line circuits, 1 and 2.
PAD Switch SW501	Two-position slide	Enables 3dB signal level drop for CO line circuit 1 (when set in PAD position).
PAD Switch SW601	Two-position slide	Enables 3dB signal level drop for CO line circuit 2 (when set in PAD position).

4) After installing the KCDU, gently pull the PCB outward. If the connectors are properly mated, a slight resistance will be felt.

13.30 KCDU Wiring

13.31 Refer to KCDU Wiring Diagram in Section **100-816-208** for wiring/interconnecting details.

13.40 KCDU Programming Overview

13.41 See the PCOU programming overview and the PDKU overview in this chapter for KCDU programming information. When running **Program 03** for the KCDU slot(s), specify code 65 if the KCDU does not support OCA or PDIU-DI telephones or code 66 if the KCDU supports OCA or PDIU-DI telephones. Do not specify code 11, 61, 62, or 64.

14 DTMF RECEIVER/ABR TONE DETECTOR UNIT (K4RCU)

14.00 General

14.01 The K4RCU must be installed to recognize Dual-Tone Multi-Frequency (DTMF) tones generated by a standard telephone (or any other device connected to a standard telephone circuit) and it is required for Direct Inward System Access (DISA) calls. The K4RCU can only be installed in the Base Unit. The K4RCU circuits are also used to detect busy tone for the Automatic Busy Redial (ABR) feature and must be installed to allow ABR to operate.

14.10 K4RCU Configuration

14.11 The K4RCU does not have to be configured for operation.

14.20 K4RCU Installation Procedure

14.21 Install the K4RCU in accordance with the following steps (Figure 5-22).

1) Remove the PCB from its protective packaging.
2) Make sure that the power supply switch is OFF.
3) Making sure that the component side of the K4RCU is facing up toward the power supply, plug the K4RCU **P602A** and **P602B** female connectors into the **P2A** and **P2B** (K4RCU) connectors on the motherboard.

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14.30 K4RCU Wiring

14.31 The K4RCU does not require any wiring.

14.40 K4RCU Programming Overview

14.41 The following parameters may be specified:

Program 03

- Enter code 92 for Slot 00 if K4RCU is installed.

Program 12

- Set K4RCU release time.

Program 15

- Sets K4RCU operation after CO line flash.

15 BUILT-IN CO LINE AND DIGITAL TELEPHONE CIRCUITS

15.00 General

15.01 As mentioned in Paragraph **2**, the Base Unit comes standard with four CO lines and eight digital telephone circuits already installed.

15.10 Built-in CO Line Circuits

15.11 The four standard loop start CO line circuits are on a printed circuit board (PCB) called the KCOU, which is installed on the motherboard at the factory (Figure 5-23). The KCOU circuits are identical to the PCOU and KCDU CO line circuits. The KCOU also has four PAD (3 dB) switches—**SW400**, **SW425**, **SW450**, and **SW475**—to reduce excessive loudness caused by a nearby CO or PBX telephone system. For wiring and programming considerations, see the PCOU instructions in Paragraph **8**. The Base Unit circuits are fixed and are assigned to Base Unit virtual equipment slots as follows: 8-digital station circuit to slot 01, 4-CO line circuits (KCOU) to slot 02, and 4 standard telephone circuits (KSTU) to slot 3.

15.20 Digital Telephone Circuits

15.21 The eight digital telephone circuits that come standard with the system are integrated into the motherboard in the Base Unit. These circuits are indentical to the digital circuits found on the PDKU and KCDU. The motherboard does not have to be configured for the digital circuits to operate. For wiring and programming considerations, see the PDKU instructions in Paragraph **7**.

15.30 Base Unit CO Line/Digital Station Circuit Wiring

15.31 Refer to Section **100-816-208** for details.

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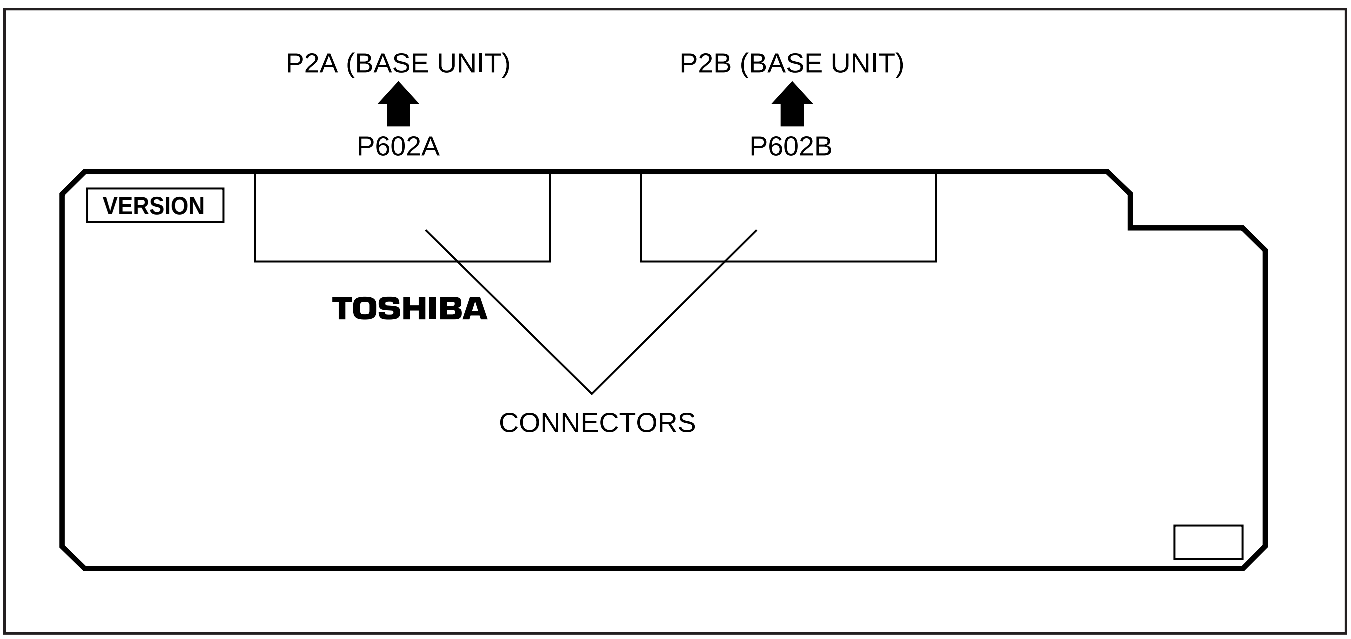


FIGURE 5-22
K4RCU PCB

16 KCOU REMOVAL AND REPLACEMENT

16.00 General

16.01 The KCOU comes factory-installed in the Base Key Service Unit (Figure **5-3**); if necessary, it can be removed and replaced.

16.10 KCOU Removal

1) Make sure the Power Supply (KPSU16) DC power switch is turned off.
2) Loosen and remove screws 1 and 2 (Figure **5-23**).
3) Pull back plastic stand-off tab and pull up on KCOU until **P7** is unplugged.
4) Pull wires on **P6** and remove **P6** connector from Base Unit.

16.20 KCOU Replacement

1) Make sure the Power Supply (KPSU16) DC power switch is off.
2) Mate and connect KCOU **P6** cable connector to **P6** on Base Unit motherboard so that the red wire is aligned as shown in Figure **5-23**.
3) Position KCOU as shown in Figure **5-23**.
4) Mate and connect KCOU **P7** to **P7** on the Base Unit motherboard.
5) Secure plastic stand-off tab and install screws 1 and 2.
6) Set **SW400** ~ **475** to appropriate position. In most cases set to the normal position (NOR); if CO lines are connected to a PBX or are in close proximity to the Central Office, set to the PAD position to provide a 3 db loss in signal level.

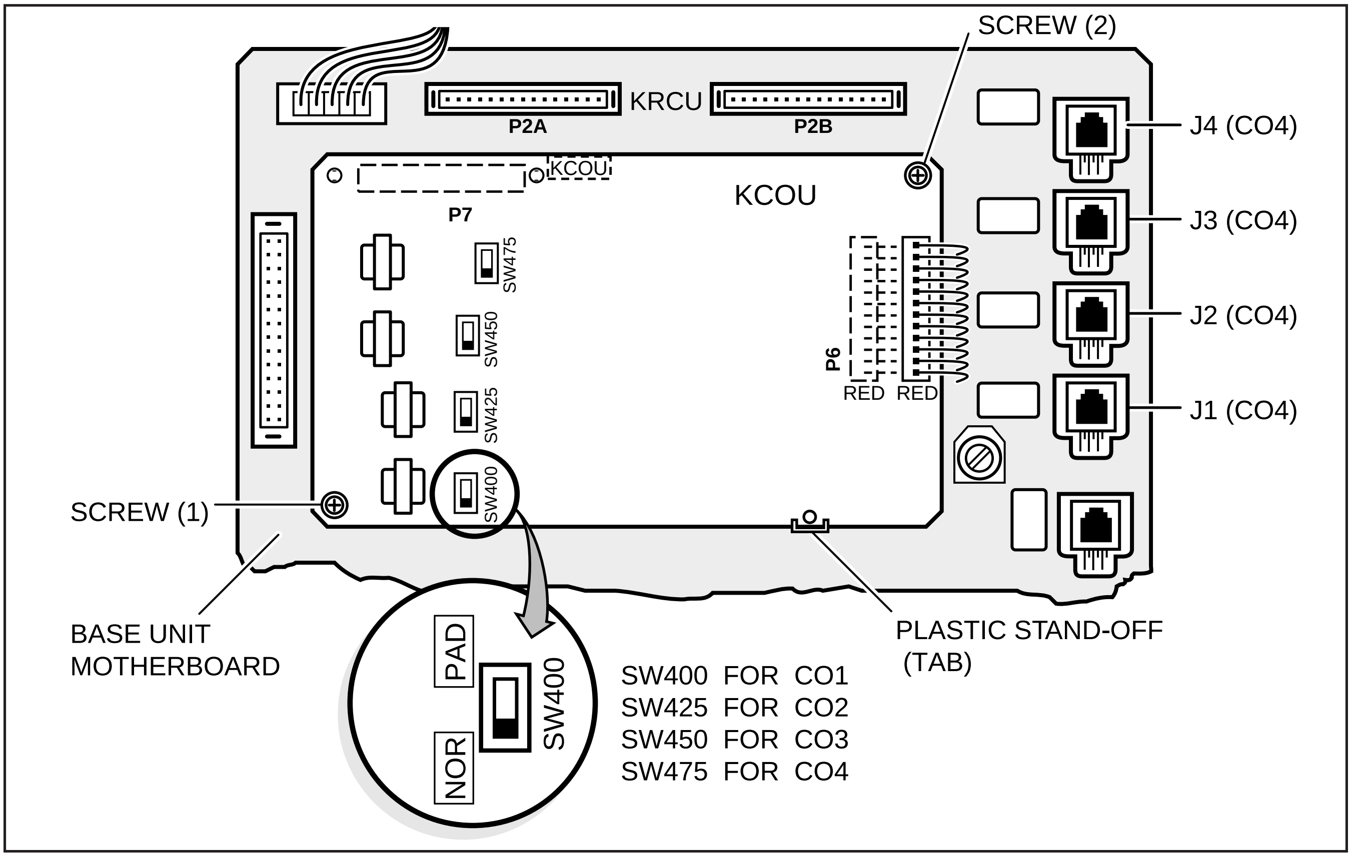


FIGURE 5-23
KCOU PCB

17 DK16 POWER FAILURE EMERGENCY TRANSFER OPTION

17.00 A dedicated standard telephone can be connected to the Power Failure Transfer Interface (PF1) on the DK16 Base Unit to provide power failure backup. During normal operation, this telephone cannot be used—it does not count as a station; so it does not reduce the system's 20 maximum station capacity. But if there is a power failure, the telephone will automatically be connected to CO line 1. When power is restored, the system will automatically resume with its normal station and CO line assignments, and the dedicated telephone will become inoperative again.

17.10 DK16 Power Failure Emergency Transfer Installation. Install the dedicated emergency standard telephone as follows (see Figure 5-24):

1) Connect a standard telephone to the PF1 connector in the Base Unit.

17.11 DK16 Power Failure Emergency Transfer Test.

1) Turn the system power switch off.
2) Lift the emergency standard telephone handset, and verify that there is CO dial tone.

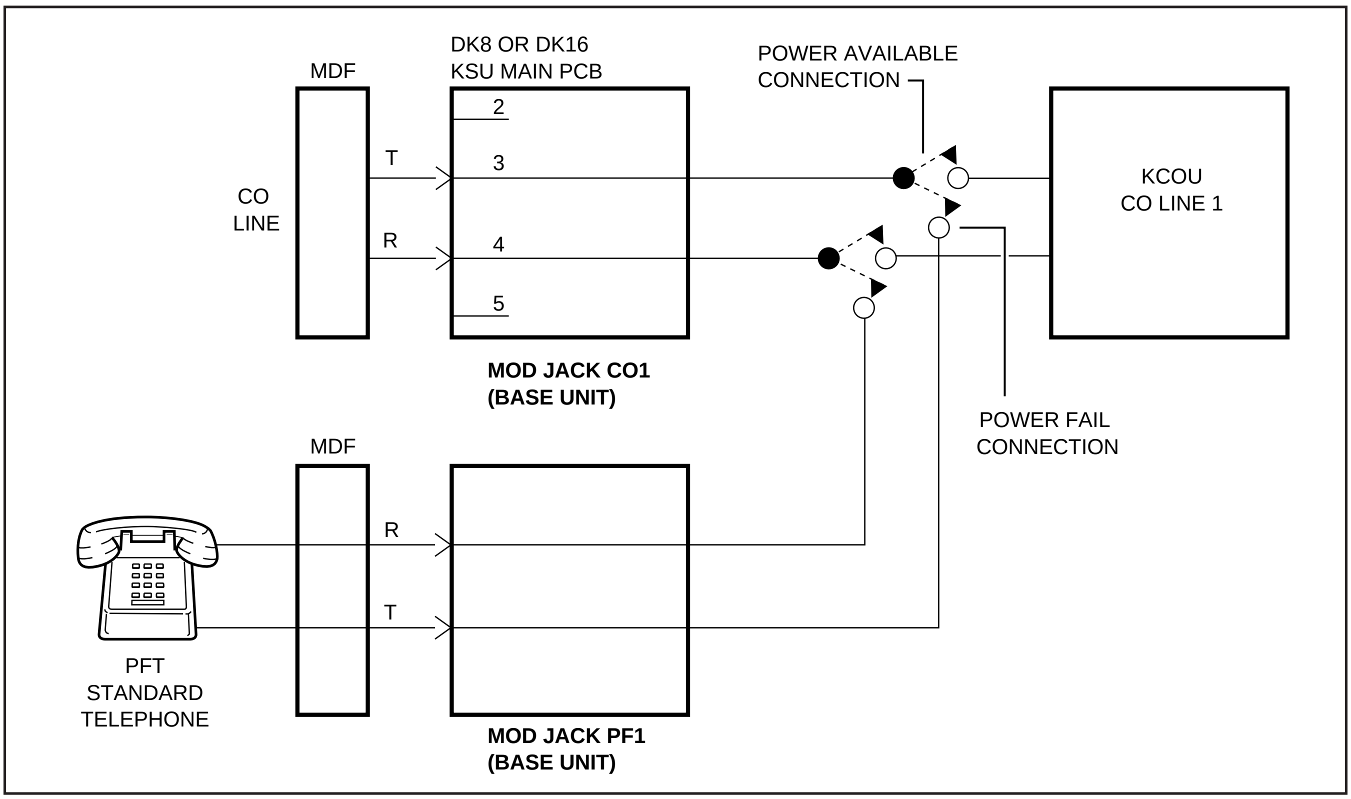


FIGURE 5-24
DK16 BASE UNIT POWER FAILURE TRANSFER (PFT) CIRCUIT DIAGRAM

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Strata® DK8 & DK16

INSTALLATION

CHAPTER SIX
STATION APPARATUS INSTALLATION

H

TABLE OF CONTENTS

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FIGURE LIST

1 OVERVIEW

1.00 Purpose

1.01 This chapter provides instructions on how to connect telephones to the STRATA DK8 and DK16 systems and how to configure and upgrade them for optional features. Procedures for installing direct station selection consoles and door phones also appear in this chapter.

1.10 Types of Telephones

1.11 The STRATA DK8 and DK16 systems can support the following telephones.

- **Digital Telephones:** Installation instructions for digital telephones in this chapter and elsewhere in this manual apply only to the Toshiba 2000- and 1000-series Digital Telephones. The 2000-series Digital Telephones consist of four models: the DKT2010-H, the DKT2010-SD, the DKT2020-S, and the DKT2020-SD. There are two 1000-series Digital Telephone models, the DKT1020-H and the DKT1020-SD.
- **Electronic Telephones:** (DK16 only) The electronic telephone instructions here apply to the Toshiba 6500-series Electronic Telephones, although there are other electronic telephones (the 2000-, 3000-, 6000-, and 6500-series) that are compatible with the STRATA DK16. The 6500-series electronic telephones consist of four models: the EKT6510-H, the EKT6510-S, the EKT6520-H, and the EKT6520-SD.
- **Standard Telephones:** 500- and 2500-type standard telephones apply whenever standard telephones are mentioned in this manual.

2 TELEPHONE INSTALLATION

2.00 General

2.01 This section describes the wiring required to connect telephones to the system. Before installing any telephone wiring, read the following warning and caution notes:

WARNING!

1. ***Never install the telephone wiring during a lightning storm.***
2. ***Never install the telephone jacks in wet locations, unless the jack is specifically designed for wet locations.***
3. ***Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.***
4. ***Use caution when installing or modifying telephone lines.***
5. ***If telephone, DSS console, Door phone control box, or Door phone wiring exits the building, external secondary protection is required. See Section 100-816-208.***

CAUTION!

When installing the station cable, do not run parallel to and within three feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

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2.10 Connecting Digital Telephones to the System

2.11 The following provides information on how to connect digital telephones to the DK8 or DK16 system.

NOTE:
*Before proceeding, see warning and caution notes in Paragraph **2.01**.*

2.12 Digital telephones connect to the digital telephone ports via the main distribution frame (MDF) with standard twisted-pair jacketed telephone cable. Single-pair wiring is sufficient in most cases for digital telephones to operate effectively at up to 1000 feet from the key service unit, if using 24 AWG cable. But digital telephones that are equipped with Integrated Data Interface Units or ADMs should have two-pair (or external power) to function effectively at this distance. This also applies to digital telephones that are supported by systems that must operate with battery reserve power—see Wiring Diagrams, Section **100-816-208**, for loop limits (see Table 8-D).

To accommodate the digital telephone line cord, the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard single-pair, modular digital telephone cord that is sent with the telephone is 7 feet (the maximum allowed is 25 feet).

NOTES:

1. *Digital telephone cable runs must not have the following:*
   - *Cable splits (single or double)*
   - *Cable bridges (of any length)*
   - *High resistance or faulty cable splices*
2. *See Section **100-816-208** for secondary protector information.*

2.20 Connecting Electronic Telephones to the System (DK16 only)

2.21 The following provides information on how to connect electronic telephones to the DK16 system.

NOTE:
*Before proceeding, see warning and caution notes in Paragraph **2.01**.*

2.22 Electronic telephones are connected to electronic telephone circuits in the DK16 Expansion Unit on the Electronic Telephone Interface Unit (PEKU) and the Standard/Electronic Telephone Interface Unit (PESU) via the main distribution frame (MDF) with standard twisted-pair jacketed telephone cable. Two-pair wiring, as a minimum, is required for telephone connection. However, three-pair wiring is recommended to permit future upgrades, such as Off-hook Call Announce.

To accommodate the electronic telephone line cord, the cable should be terminated in a modular station connector block (RJ-11) at the station location. The standard two-pair modular electronic telephone cord length is seven feet (the maximum allowed length is 25 feet). See Wiring diagrams, Section **100-816-208** for more details.

NOTE:
*See Section **100-816-208** for secondary protector information.*

The overall length of the station cable run from the DK16 key service unit (KSU) to the telephone must not exceed 1,000 feet (305 meters), if using 24 AWG cable.

2.30 Connecting Standard Telephones to the System

2.31 The following provides information on how to connect standard telephones to the DK8 or DK16 system.

NOTE:
*Before proceeding, see warning and caution notes in Paragraph **2.01**.*

2.32 Standard telephones connect to standard telephone circuits in the DK8 Standard Telephone Interface Unit (QSTU), telephone circuits on the DK16 Base Unit Standard Telephone Interface Unit (KSTU), the DK16 Standard Telephone Interface Unit (PSTU), and the DK16 Standard/Electronic Telephone Interface Unit (PESU) via the main distribution frame (MDF) with standard twisted-pair jacketed telephone cable. Single-pair wiring is required. (Refer to Wiring Diagrams, Section **100-816-208**, for more details.)

NOTE:
*See Section **100-816-208** for secondary protector information.*

The standard telephone cable's overall loop resistance, connected on- or off-premises, is 300 ohms maximum, including the telephone resistance. This also applies to all devices connected to standard telephone circuits. A standard telephone connected off-premises via the telephone network should interface with OL13A lines (or equivalent) and connect to an RJ21X FIC jack (or equivalent).

2.40 Telephone Wall Mounting

2.41 This section provides instructions on how to mount digital telephones and electronic telephones (DK16 only) to a wall or other vertical surface. Instructions on mounting standard telephones are not provided here; refer to the manufacturer's documentation for those instructions.

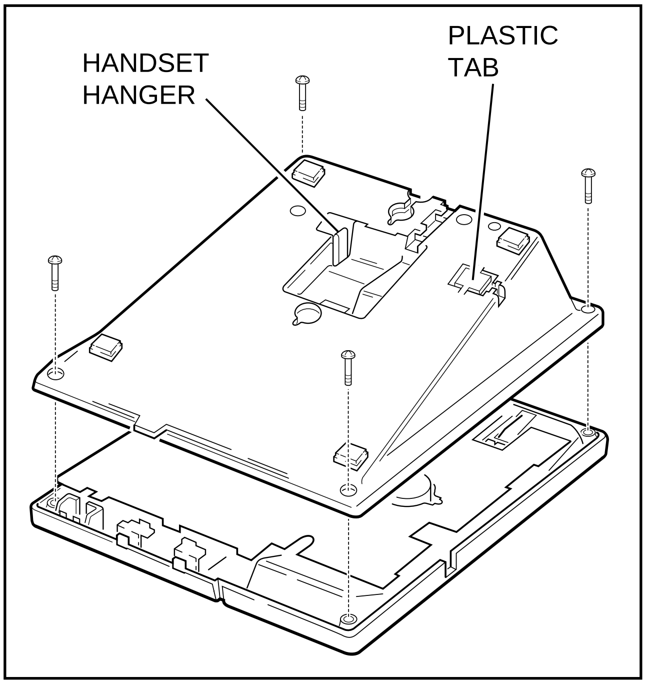


FIGURE 6-1
REMOVING THE TELEPHONE BASE

2.42 Mount digital and electronic telephones in accordance with the following steps:

NOTES:
1. *Digital telephones equipped with Integrated Data Interface Units (PDIU-DIs or PDIU-DI2s) cannot be wall mounted.*
2. *Electronic and older digital telephones equipped with an HHEU1 can be wall mounted. 2000-series Digital Telephones with headsets can only be wall mounted with an HHEU2.*

1) Loosen the captive screws, and remove the telephone base (Figure 6-1).

2) Using a suitable cutter, remove the handset hanger from the base (Figure 6-1). Insert the handset hanger in the slot provided on the front of the telephone (Figure 6-2). The hanger fits in the notch on the handset cradle.

3) Rotate the telephone base 180 degrees and secure it to the telephone with its four captive screws (Figure 6-3).

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FIGURE 6-2
HANDSET HANGER

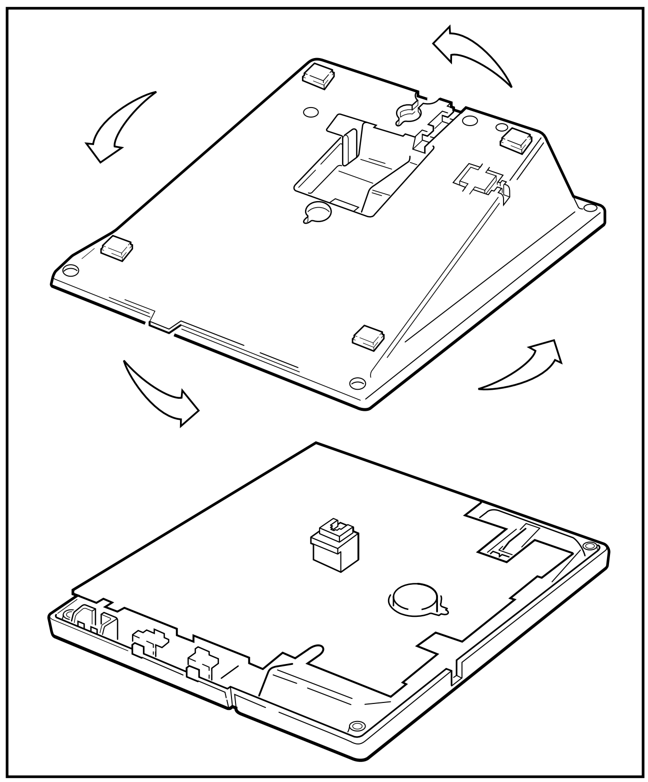


FIGURE 6-3
WALL MOUNTING BASE ROTATION

4) Connect the telephone to the wall modular connector with a cord approximately four inches long (available at most telephone supply companies). Route the cord into the hollow portion of the base.

5) Mount the telephone on the wall mounting modular connector plate.

3 DIGITAL TELEPHONE UPGRADES

3.00 This section describes how to upgrade and configure 2000- and 1000-series Digital Telephones for features and options.

3.10 Simultaneous Voice and Data Upgrade (PDIU-DI2 and PDIU-DI)

3.11 Both the 2000- and 1000-series Digital Telephones can be upgraded with an integrated data interface unit to transmit and receive simultaneous voice and data calls. There are two versions of the integrated unit: the PDIU-DI and the PDIU-DI2. The 2000-series telephones can only be equipped with a PDIU-DI2, and the 1000-series telephones can only be equipped with a PDIU-DI. Asynchronous devices, such as personal computers (PC) and terminals, can be connected to the standard RS-232 connector of the PDIU-DI(2). Station users are able to transmit and receive RS-232 data over the single wire pair of the PDIU-DI(2)-equipped telephone.

3.12 Data calls can be manually dialed with a **Data Call** button and disconnected with a **Data Release** button on the telephone; or, data and voice calls can be dialed from the keyboard of the terminal or PC using standard "AT" commands. Digital telephones may also be assigned a **Modem** button to reserve a modem or monitor modem availability and status. Assign feature buttons to telephones with **Program 39**.

NOTES:

1. *1000- and 2000-series Digital Telephones equipped with a PDIU-DI(2) cannot be wall-mounted or equipped with an Add-On-Module (ADM), or DVSU for OCA. A 2000-series digital telephone equipped with a PDIU-DI2 can support an HHEU at the same time, but cannot support a DVSU. A 1000-series Digital Telephone equipped with a PDIU-DI cannot support an HHEU, ADM, or a DVSU for OCA.*
2. *PDKU1 circuits 1 ~ 7 only can support PDIU-DI(2)s, but all PDKU2 and base unit digital circuits, can support PDIU-DI(2)s.*

3.13 PDIU-DI(2) Installation. Install the integrated data interface unit (PDIU-DI for 1000-series and PDIU-DI2 for 2000-series) in accordance with the following steps:

1) Loosen the four captive screws securing the digital telephone base and remove it (Figure 6-1).

2) Refer to Figure 6-4 for 2000-series telephones or Figure 6-5 for 1000-series telephones, and insert the two integrated unit wire plugs into the connectors on the printed circuit board (PCB) in the telephone (observing the red wire for correct positioning).

3) Attach the integrated unit to the bottom of the telephone and secure with the four captive screws.

4) Remove the telephone number directory tray from the original telephone base and install it on the integrated unit telephone base. Bend the tray by squeezing its sides so it bows slightly to remove and re-install (Figure 6-4 or 6-5).

5) Check Table 8-D in Section **100-816-208**; install 2-pair house cable (or external power) and 2-pair modular cord (supplied with PDIU-DI) if required to achieve maximum distance.

3.14 Integrated Data Interface Unit Programming Overview

Program 39

- Assigns the **Data Call**, **Data Release**, and **Modem** buttons.

Programs 20 and 22

- Used for data interface unit assignments.

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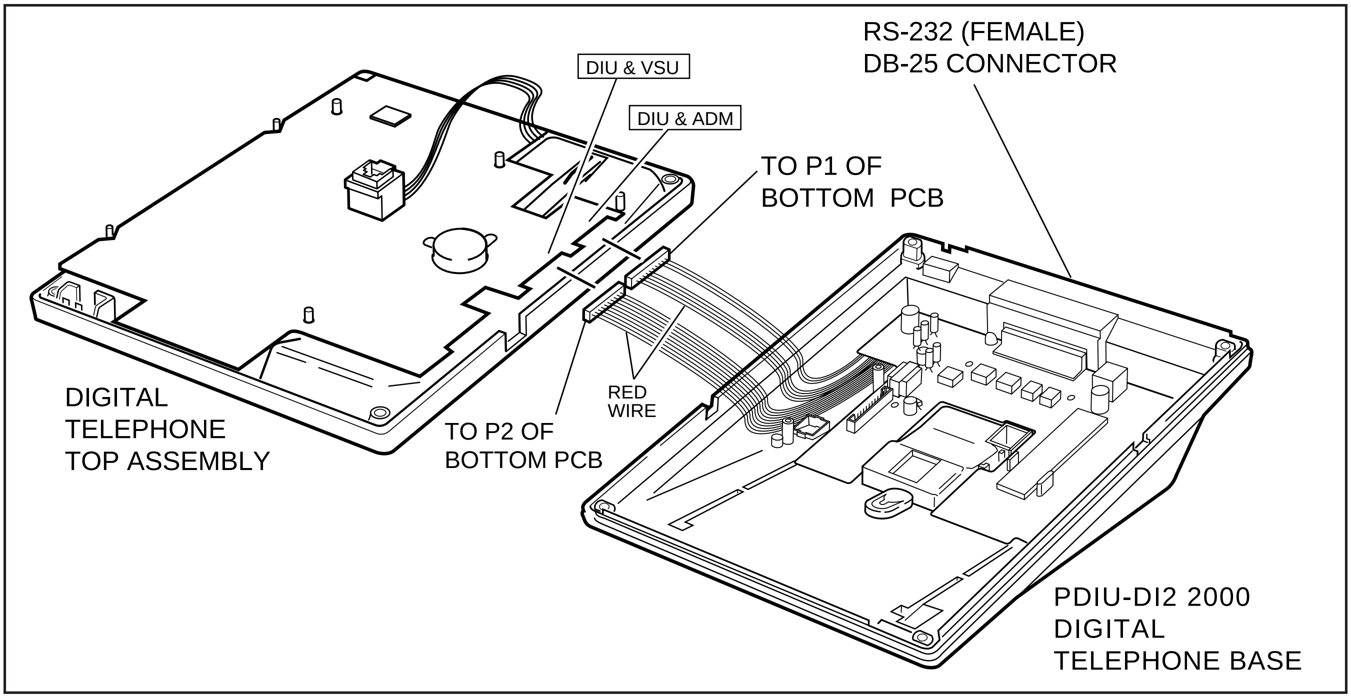


FIGURE 6-4
PDIU-DI2 INSTALLATION INTO 2000-SERIES DIGITAL TELEPHONE

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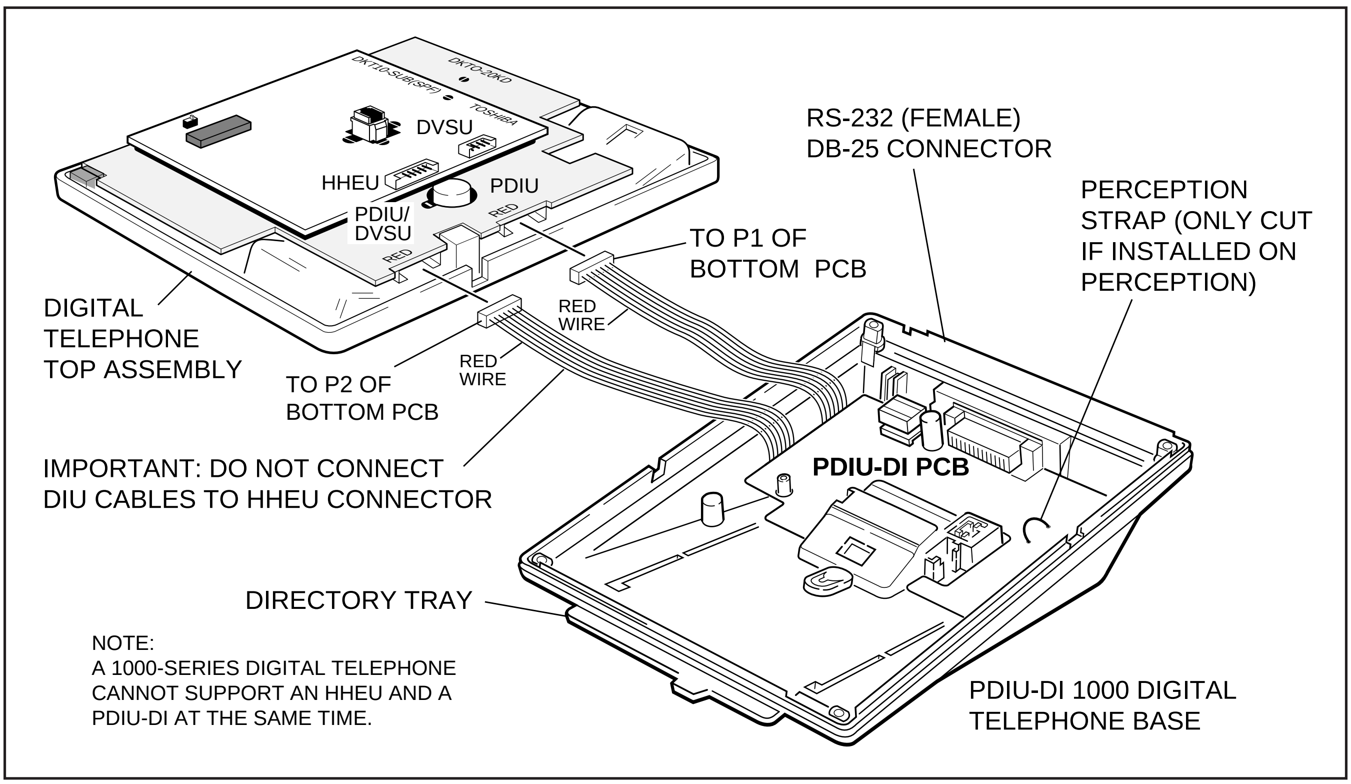


FIGURE 6-5
PDIU-DI INSTALLATION INTO 1000-SERIES DIGITAL TELEPHONE

3.20 Off-hook Call Announce Upgrade (DVSU)

3.21 To receive Off-hook Call Announce (OCA) calls, a digital telephone must be upgraded with a DVSU; the telephone making the call does not require a DVSU. An additional wire pair is not required for digital telephones that receive OCA calls. The DVSU is compatible with both 2000-series and 1000-series Digital Telephones.

NOTE:
Digital telephones cannot be equipped with a DVSU and integrated data interface unit (PDIU-DI or PDIU-DI2) at the same time.

3.22 DVSU Upgrade Installation. Install the DVSU upgrade in accordance with the following steps.

1) Loosen the four captive screws securing the telephone base (Figure 6-1) and remove the base.

2) Loosen the four captive screws securing the metal plate to the standoffs inside the base where the DVSU will be installed (Figure 6-6). Remove the plate, which can be discarded.

3) Position the DVSU PCB on the standoffs (Figure 6-6), and secure with the four provided screws.

4A) If installing the DVSU into a 2000-series digital telephone, refer to Figure 6-7 (DKT2010-H) or Figure 6-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and then connect the DVSU wire plugs to the **DVSU** connectors on the printed circuit board (PCB) inside the telephone.

4B) If installing the DVSU into a 1000-series digital telephone, refer to Figure 6-9, and connect the DVSU wire plugs to the **DVSU** connectors on the PCBs inside the telephone.

5) Reinstall the telephone base and secure it with its four captive screws.

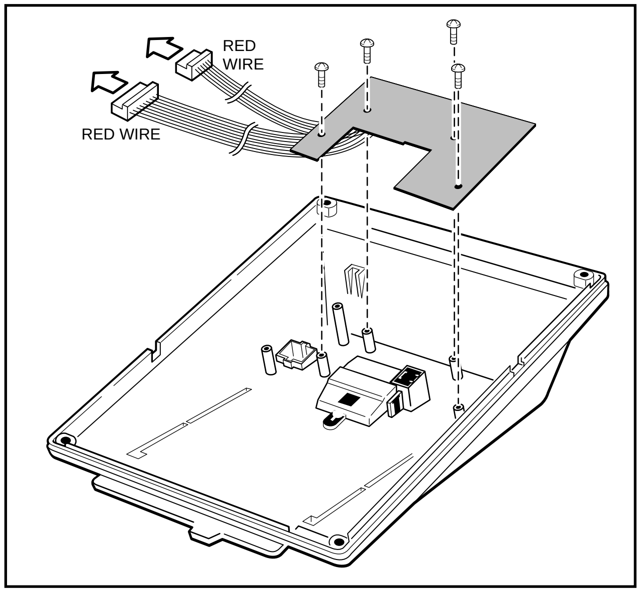


FIGURE 6-6
DVSU INSTALLATION FOR DIGITAL TELEPHONES

3.30 Loud Ringing Bell/Headset Upgrade (HHEU)

3.31 The loud ringing bell/headset upgrade (HHEU) enables an external speaker (HESB) for the Loud Ringing Bell feature and/or a headset to be connected to both series of digital telephones.

NOTES:
1. *There are two types of HHEU: the HHEU1 (which has four versions, **V.1** ~ **V.4**) and the HHEU2.*
2. *Both 2000- and 1000-series Digital Telephones require either an HHEU2 or a **V.3** or **V.4** HHEU1 for HESB operation; earlier HHEU1 versions are only sufficient for headset operation only.*
3. *Only digital telephones equipped with an HHEU2 can be wall mounted. The HHEU2 is identical to the **V.4** HHEU1, except that the HHEU2 has longer wires to accommodate wall mounting.*
4. *A Toshiba HESC-65A cable is required to connect the HHEU in a digital telephone to the HESB.*
5. *1000-series digital telephones cannot be equipped with the HHEU (any type or*

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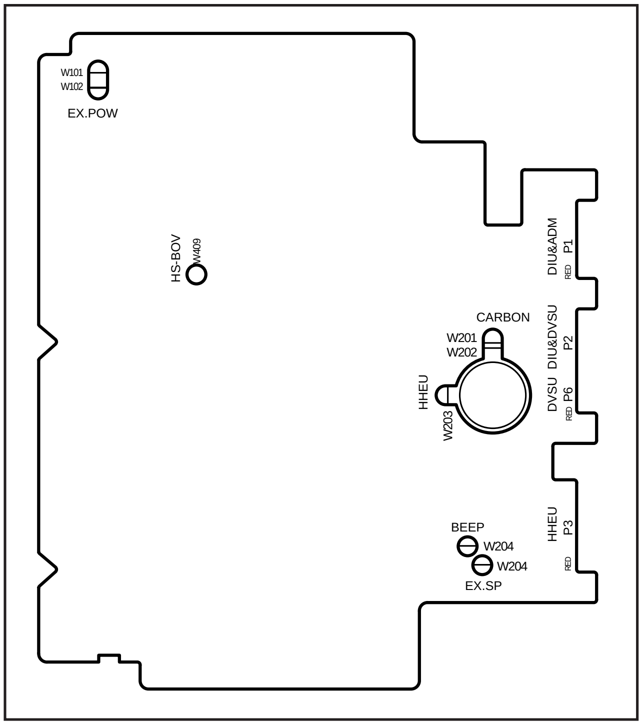


FIGURE 6-7
DKT2010-H STRAP AND CONNECTOR LOCATIONS

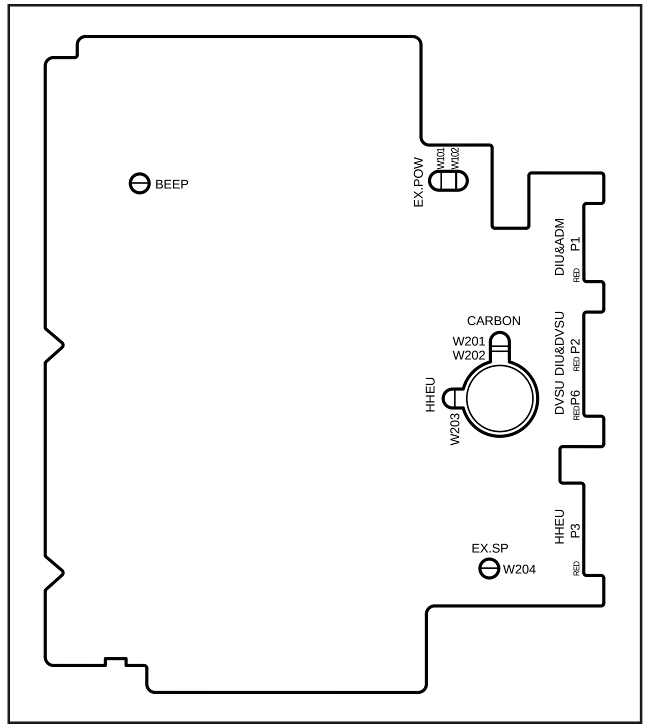


FIGURE 6-8
DKT2010-SD, DKT2020-S, AND DKT2020-SD STRAP AND CONNECTOR LOCATIONS

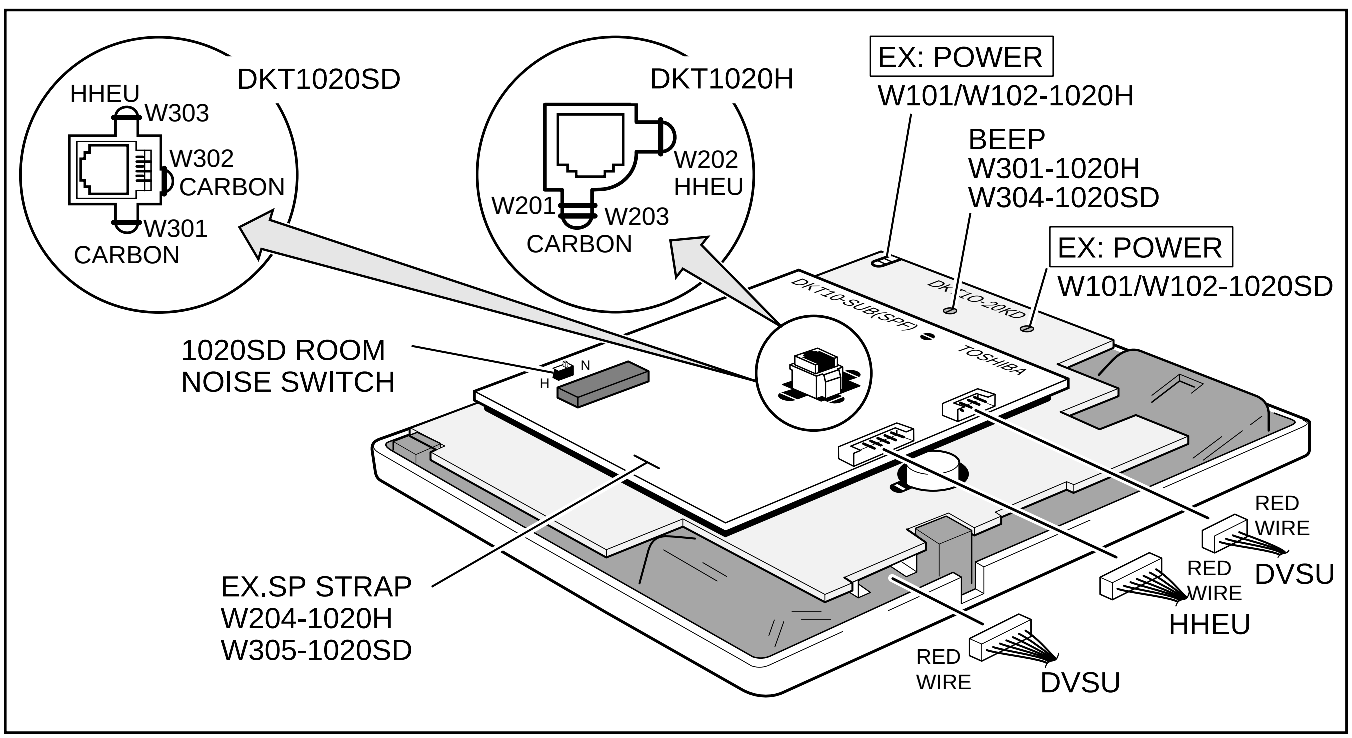


FIGURE 6-9
1000-SERIES DIGITAL TELEPHONE STRAP AND CONNECTION LOCATIONS

version) and the integrated data interface unit (PDIU-DI) at the same time, but 2000-series digital telephones can support an HHEU and a PDIU-DI2 at the same time.

3.32 HHEU Upgrade Installation (HHEU) Install the Loud Ringing Bell/headset upgrade (HHEU) in accordance with the following steps.

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Using a screwdriver or other suitable tool, remove the plastic tab located on the back of the base (Figure 6-1); the HHEU modular connector for the headset will be accessed through this opening.

3) If installing a **V.3** HHEU1, set the **SW601** switch on the HHEU to **HEADSET** for the headset or loud bell application (Figure 6-10). **V.4** HHEU1 and HHEU2 do not have this switch, because both of these upgrades are automatically set for the headset/loud bell application.

4) Connect the HESC-65A cable to **P601** of the HHEU (both HHEU1A versions and the HHEU2 have **P601**) if the Loud Ringing Bell option is required (Figure 6-11). Refer to Section **100-816-207** for HESB installation procedures.

5A) For the **V.3** HHEU1**:** If only the headset is connected to the HHEU, cut both sides of the **R607** resistor (Figure 6-10), then remove the resistor to eliminate electrical contact.

NOTE:
*Do not cut the **R607** resistor if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

5B) For the **V.4** HHEU1 and the HHEU2: If only the headset is connected to the HHEU, cut the **OCA** strap (Figure 6-10).

NOTE:
*Do not cut the **OCA** strap if connecting an HESB to the HHEU for the Loud Ringing*

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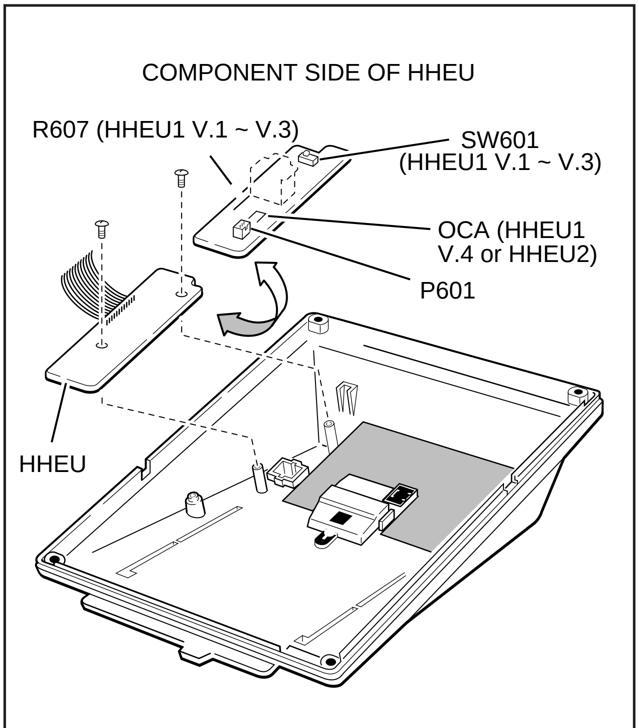


FIGURE 6-10
HHEU INSTALLATION FOR DIGITAL TELEPHONE

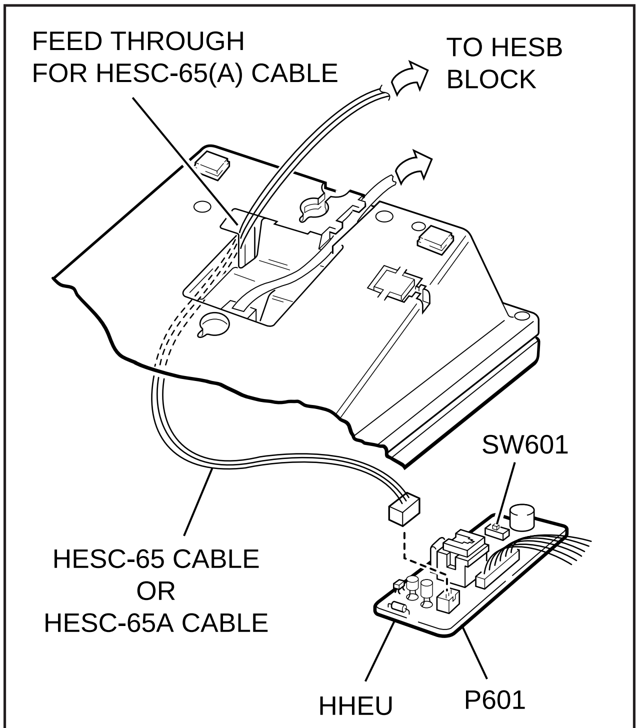


FIGURE 6-11
HESC-65A CABLING

Bell—even if a headset is also installed on the HHEU.

6) Position the HHEU PCB on the standoffs inside the base (Figure 6-10), and secure with the two provided screws.

7A) For 2000-series digital telephones, refer to Figure 6-7 (DKT2010-H) or Figure 6-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and connect the wire plug of the HHEU PCB to the **HHEU** connector on the printed circuit board (PCB) on the telephone.

7B) For 1000-series digital telephones, refer to Figure 6-9, and connect the wire plug of the HHEU to the **HHEU** connector on the PCB of the telephone.

8A) For 2000-series digital telephones, refer to Figure 6-7 (DKT2010-H) or Figure 6-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and locate the **EX.SP** strap on the PCB in the telephone. Cut the strap if an HESB will be connected to the HHEU.

8B) For 1000-series digital telephones, refer to Figure 6-9, and locate the **EX.SP** strap on the upper PCB in the telephone, and cut it if an HHEU will be connected to an HESB for the Loud Ringing Bell option.

9A) For 2000-series digital telephones, refer to Figure 6-7 (DKT2010-H) or Figure 6-8 (DKT2010-SD, DKT2020-S, DKT2020-SD), and locate the **HHEU** strap on the PCB in the telephone. Cut the strap if a headset will be connected to the HHEU.

9B) For 1000-series digital telephones, refer to Figure 6-9, and locate the **HHEU** strap on the upper PCB in the telephone. Cut the strap if an HHEU will be connected to a headset.

NOTE:
If the HHEU PCB is removed from the telephone, the HHEU strap must be replaced for proper telephone operation.

10) Reinstall the telephone base, and secure it with its four captive screws.

11) To adjust the volume of the HESB Loud Ringing Bell: Call the telephone connected to the HESB, and adjust the volume control on the back of the HESB and the ring volume control on the telephone.

3.40 Carbon Headset/Handset Straps

3.41 If a carbon-type handset or headset is connected to the handset jack on the side of the telephone, two jumper straps inside the telephone must be cut. Cut the straps in accordance with the following steps:

NOTE:
It is not necessary to cut these straps if the headset is connected to the HHEU.

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2A) For 2000-series digital telephones refer to Figure 6-7 or 6-8, and cut the **CARBON** straps, **W201** and **W202**.

2B) For 1000-series digital telephones, refer to Figure 6-9, and cut the **CARBON** straps, (**W301** and **W302** on the DKT1020-SD; **W201** and **W203** on the DKT1020-H).

3) Reinstall the telephone base, and secure it with its four captive screws.

3.50 Beep Strap

3.51 A "beep" sounds whenever a dialpad button or feature button is pressed on a digital telephone. To eliminate this beep follow the procedure below:

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2A) For 2000-series digital telephones, refer to Figures 6-7 or 6-8**,** and cut the **BEEP** strap.

2B) For 1000-series digital telephones, refer to Figure 6-9, and cut the **BEEP** strap.

3) Reinstall the telephone base, and secure it with its four captive screws.

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3.60 Microphone/Speaker Sensitivity Adjustment (Speakerphones Only)

3.61 High ambient noise levels may cause the speaker on some digital telephone speakerphone models to cut off frequently. To prevent this for the 1000-series digital telephone models, perform the following procedure to make the telephones less sensitive to the noise: (The 2000-series Telephones are adjusted per the instructions in the Note after the procedure.)

1) Loosen the four captive screws securing the 1000-series Digital Telephone speakerphone base (Figure 6-1), and remove the base.

2) For the 1000-series speakerphone model (DKT1020-SD), refer to Figure 6-9, and locate the **ROOM NOISE** switch. Push the switch carefully to the **H** (high) position (for low sensitivity) when there is high background noise in the area surrounding the telephone.

3) Reinstall the telephone base, and secure it with its four captive screws.

NOTES:

1. *To make the 2000-series Digital Telephone speakerphone models less sensitive to loud surrounding noise, hold down* **Mic** *button, then press the up* **Vol** *button. The less-sensitive level will be set after the third flash of the Mic LED. To reset the sensitivity back to the normal level, hold down the* **Mic** button*, then press the down* **Vol** *button. The normal level will be set after the third flash of the Mic LED.*
2. *On 2000-series Digital Telephone speakerphone models that are set for low sensitivity, the Mic LED will flash at the in-use rate when using the speakerphone. When set to normal sensitivity, the Mic LED will be on steady when using the speakerphone.*

3.70 Busy Override and Camp-on Ring Tone Over Handset/Headset Option

3.71 The Busy Override and Camp-on Ring tones can be sent over the telephone handset or headset, in addition to the speaker, with 2000-series digital telephones. The tones only sound over the speaker with 1000-series Digital Telephones. Perform the following procedure to have these tones sent over the handset of the DKT2010-H model: (For the DKT2010-SD, the DKT2020-S, and the DKT2020-SD models, see the Note following the procedure.)

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Refer to Figure 6-7, and install a strap in the **HS-BOV W409** location.

3) Reinstall the telephone base, and secure it with its four captive screws.

NOTES:

1. *To enable Busy Override tone and Camp-on Ring tones over the handset or headset of a DKT2010-SD, DKT2020-SD, DKT2020-S model, hold down the* **Redial** *button and press the up* **Vol** *button. To block the tone, hold down the* **Redial** *button and press the down* **Vol** *button.*
2. *For this to function properly with headsets, make sure the OCA strap or R607 is cut on the HHEU PCB and the HHEU strap is cut on the telephone (see Paragraph 3.32).*

3.80 External Power Straps

3.81 Digital telephones equipped with options such as Integrated Data Interface Units and ADMs require two-pair wiring or external power to operate efficiently at the maximum-allowed distance from the key service unit (KSU). Two-pair wiring or external power is also necessary for maximum cable run lengths for digital telephones that are connected to systems that must operate with reserve power. (See Table 8-D in Section **100-816-208** for reference.)

Each Digital telephone has two external power straps which must be cut for external power when the cabling of the telephone is connected to an external AC/DC power supply. Cut these straps in accordance with the following procedure:

H

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Depending on the telephone, refer to Figure 6-7, 6-8, or 6-9 and locate the **EX.POW** straps, **W101** and **W102**. Cut these straps.

3) Reinstall the telephone base, and secure it with its four captive screws.

NOTE:
*Refer to Section **100-816-208** for external AC/DC power supply ordering information and installation instructions.*

3.90 DKT2000 Add-On-Module Installation

3.91 See Paragraph **7** in this chapter.

4 ELECTRONIC TELEPHONE UPGRADE OPTIONS (DK16 Only)

4.00 This section describes how to upgrade and configure electronic telephones for features and options.

4.10 Off-hook Call Announce Upgrade (HVSU2 or HVSU/HVSI)

4.11 Electronic telephones must be equipped with either the HVSU2 subassembly or the combined HVSU and HVSI subassemblies to receive Off-hook Call Announce (OCA) calls**.** These telephones also require three-pair wiring to receive OCA, instead of the standard two-pair. Telephones making OCA calls do not require an upgrade or extra wire pair.

4.12 HVSU2 Upgrade Installation. Install the HVSU2 in accordance with the following steps:

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Position the HVSU2 on the standoffs inside the base, and secure with the two provided screws (Figure 6-12).

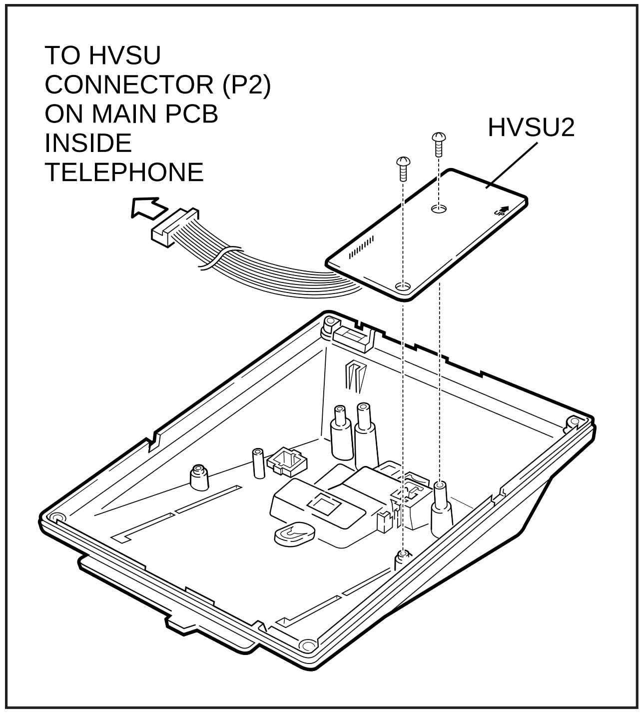


FIGURE 6-12
HVSU2 INSTALLATION FOR ELECTRONIC TELEPHONES

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3) Connect the HVSU2 wire plug to the **P2** connector on the printed circuit board (PCB) in the telephone (Figure 6-13).

4.13 HVSU/HVSI Upgrade Installation. Install the HVSU/HVSI subassemblies in accordance with the following steps:

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Align the **P5** connector on the HVSI subassembly with the receptacle on the HVSU subassembly (Figure 6-14). Apply firm, even pressure to the PCBs to ensure that the connectors mate properly (they should click).

NOTE:
Exercise care when assembling the HVSU to the HVSI to prevent damage to the connector pins; also, verify that the HVSU is aligned with the silk-screened image on the HVSI.

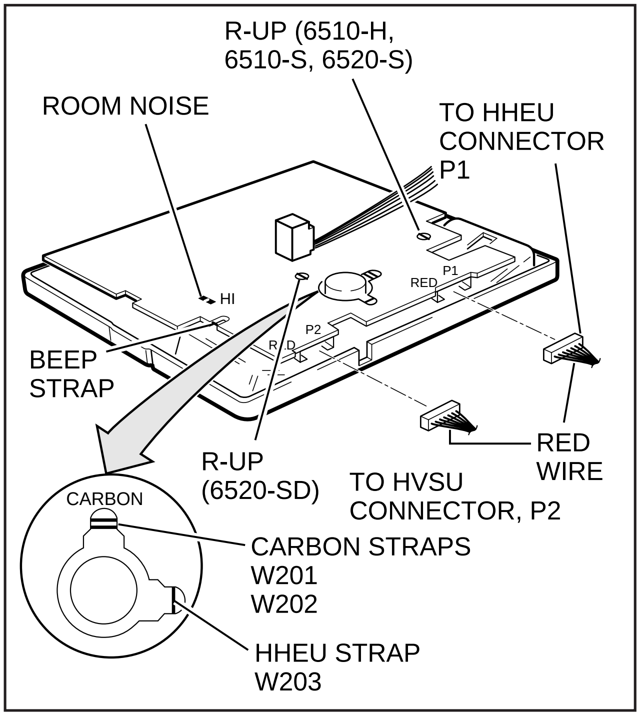


FIGURE 6-13
ELECTRONIC TELEPHONE PCB CONNECTIONS

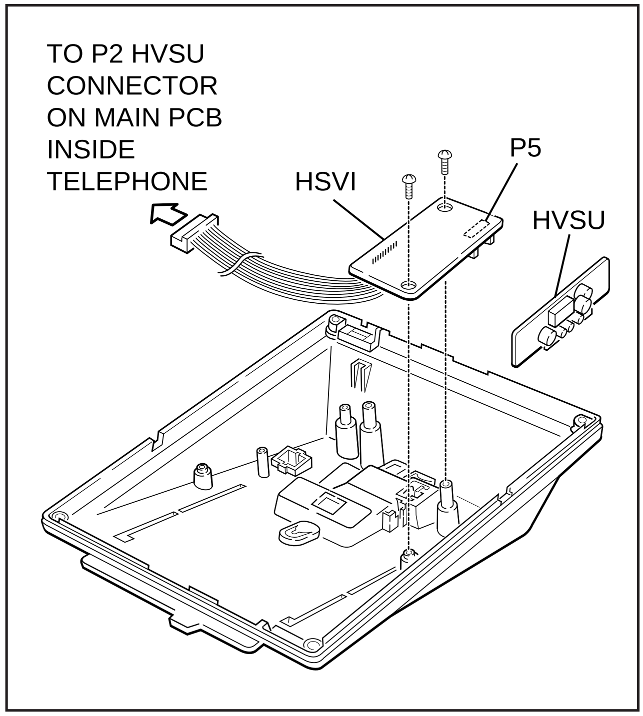


FIGURE 6-14
HVSI/HVSU INSTALLATION FOR ELECTRONIC TELEPHONES

3) Position the HVSU/HVSI subassembly on the standoffs inside the base, and secure with the two screws provided (Figure 6-14).

4) Connect the HVSU/HVSI subassembly wire plug to the **P2** connector on the electronic telephone PCB (Figure 6-13).

5) Reinstall the electronic telephone base, and secure it with its four captive screws.

4.20 Loud Ringing Bell/Headset Upgrade (HHEU)

4.21 The Loud Ringing Bell/Headset upgrade (HHEU) enables an external speaker (HESB) and/or a headset to be connected to the electronic telephone. The HESB serves as a Loud Ringing Bell when connected to a telephone.

NOTES:

1. *There are two types of HHEU: the HHEU1 (which has four versions, **V.1** ~ **V.4**) and the HHEU2.*
2. *Only electronic telephones equipped with an HHEU2 can be wall mounted. The HHEU2 is identical to the **V.4** HHEU1, except that the HHEU2 has longer wires to accommodate wall mounting.*
3. *A Toshiba HESC-65 or HESC-65A cable is required to connect the HHEU in an electronic telephone to the HESB. Refer to Section **100-816-207** for HESB installation procedures.*
4. *All HHEU versions and types, except for **V.1** HHEU1, are compatible with the Off-hook Call Announce upgrades (HVSU2 and HVSU/HVSI).*

4.22 HHEU Upgrade Installation. Install the HHEU upgrade in accordance with the following steps:

1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Using a screwdriver or other suitable tool, remove the plastic tab located on the back of

H

the base (Figure 6-1). The HHEU modular connector for the headset will be accessed through this opening.

3) If using a **V.3** or earlier HHEU1, set the **SW601** switch to the **HEADSET** position for HESB and/or headset connection (Figure 6-15). This switch is not on either the **V.4** HHEU1 or the HHEU2, because the operation is automatic with these subassemblies.

4) Connect the HESC-65 or HESC-65A cable (either one) to **P601** of the HHEU if the Loud Ringing Bell option is required (Figure 6-11). Refer to Section **100-816-207** for HESB installation procedures.

5A) For the **V.3** or earlier HHEU1**:** If only the headset is connected to the HHEU, cut both sides of the **R607** resistor on the HHEU (Figure 6-15) and then remove the resistor to eliminate electrical contact.

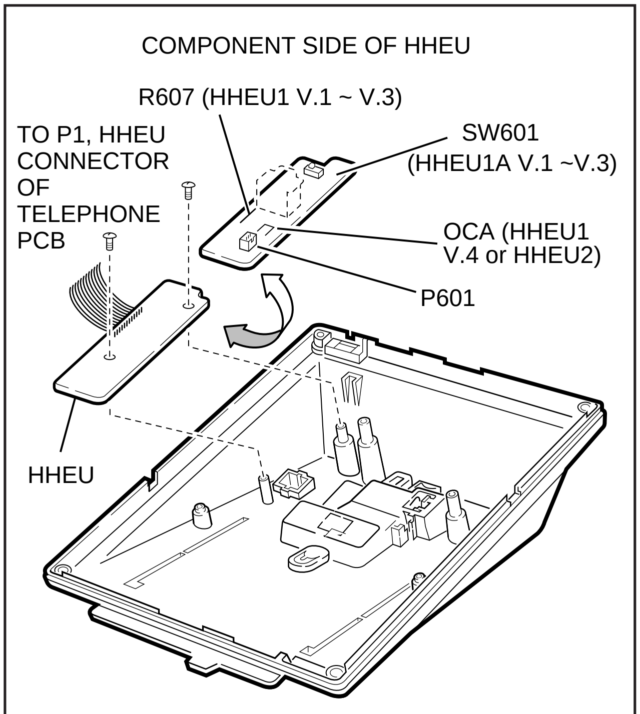


FIGURE 6-15
HHEU INSTALLATION FOR ELECTRONIC TELEPHONES

NOTE:
*Do not cut the **R607** resistor if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

5B) For the **V.4** HHEU1 or the HHEU2: If only the headset is connected to the HHEU, cut the **OCA** strap (Figure 6-15).

NOTE:
*Do not cut the **OCA** strap if connecting an HESB to the HHEU for the Loud Ringing Bell—even if a headset is also installed on the HHEU.*

6) Position the HHEU subassembly on the standoffs inside the base (Figure 6-15), and secure with the two provided screws.

7) Connect the HHEU subassembly wire plug to the **P1** connector on the electronic telephone PCB (Figure 6-13).

8) Cut the **HHEU** strap on the telephone PCB (Figure 6-13).

NOTE:
The HHEU strap must be replaced if the HHEU PCB is removed from the telephone.

9) Reinstall the telephone base, and secure it with its four captive screws.

10) To adjust the volume of the HESB Loud Ringing Bell: Call the telephone connected to the HESB, and adjust the volume control on the back of the HESB and the ring volume control on the telephone.

4.30 Carbon Headset/Handset Straps

4.31 If a carbon-type handset or headset is connected to the handset jack on the side of the 6500-series electronic telephone, two straps inside the telephone must be cut. Cut the straps in accordance with the following steps:

NOTE:
It is not necessary to cut these straps if the headset is connected to the HHEU.

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1) Loosen the four captive screws securing the telephone base (Figure 6-1), and remove the base.

2) Refer to Figure 6-13, and locate the **CARBON** straps, **W201** and **W202**. Cut both straps.

3) Reinstall the telephone base, and secure it with its four captive screws.

4.40 Beep Strap

4.41 A "beep" sounds whenever a dialpad button or feature button is pressed on an electronic telephone. This beep can be eliminated with the following procedure:

1) Remove the four captive screws securing the telephone base to the telephone (Figure 6-1), and remove the base.

2) Locate and cut the **BEEP** strap on the telephone printed circuit board (PCB) (Figure 6-13).

3) Reinstall the electronic telephone base, and secure in place using the four captive screws.

4.50 Microphone/Speaker Threshold (Speakerphones only)

4.51 High ambient noise levels may cause the speaker on the electronic telephone speakerphone models (the EKT6510-S, the EKT6520-S, and the EKT6520-SD) to cut off frequently. To make these telephones less sensitive to noise and to prevent the cut-off, follow the steps below:

1) Remove the four captive screws securing the base to the telephone, and remove the base (Figure 6-1).

2) Locate the **ROOM NOISE** switch on the printed circuit board (PCB) inside the telephone, and push it carefully to the **HI** (high) position (Figure 6-13).

3) Reinstall the telephone base and secure in place using the four captive screws.

4.60 Handset Receiver Volume-up Strap (Version 2 6500-series Telephones Only)

4.61 For **Version 2** (**V.2**) 6500-series electronic telephones only, the handset receiver volume can be increased six decibels (db) by cutting a strap inside of the telephone. Cut the strap in accordance with the following steps:

1) Remove the four captive screws securing the telephone base to the telephone, and remove the base (Figure 6-1).

2) Locate the **R-UP** strap on the printed circuit board (PCB) inside the telephone, and cut it (Figure 6-13).

3) Reinstall the telephone base, and secure in place using the four captive screws.

5 DIRECT STATION SELECTION CONSOLE/SYSTEM CONNECTION (DK16 Only)

5.01 STRATA DK16 systems configured with just a Base Unit can support one Direct Station Selection Console, and systems with the optional Expansion Unit can support two consoles. There are two types of consoles: the DDSS console and the HDSS console. The DDSS console can be connected to designated digital telephone circuits, and the HDSS console can only be connected to designated PEKU circuits. This section provides instructions on how to install both types of consoles.

5.10 DDSS Console Connections

5.11 The DDSS console, which can operate with a digital or electronic telephone (preferably an LCD model), can connect only to Circuit 8 of the Base Unit digital telephone circuit set or Circuit 8 of the PDKU. Standard twisted single-pair or two-pair jacketed telephone cable (maximum 1000 feet, 303 meters) is used for the connection. To accommodate the DDSS console connection, the instrument end of the cable should be terminated in a modular station connector block (RJ-11). Refer to Wiring Diagrams, Section **100-816-208**, for wiring/interconnecting details, including cable length limitations (see Table 8-D).

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NOTE:
1. *DDSS console cable runs must not have the following:*
   - Cable splits (single or double)
   - Cable bridges (of any length)
   - High resistance or faulty cable splices
2. *See Section **100-816-208** for secondary protection information.*

CAUTION!
When installing the DDSS cable, do not run parallel to and within 3 feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

5.12 DDSS Console Configuration. The following considerations should be made when installing DDSS consoles:

- DDSS consoles can connect only to Circuit 8 of the Base Unit digital telephone circuit set or Circuit 8 of the PDKU.
- A maximum of two DDSS consoles can be installed per system equipped with an Expansion Unit.
- DDSS consoles can operate with an attendant electronic telephone, as well as with a digital one.
- A KCDU will not support a DDSS.

5.13 DDSS Programming Overview
Program 03
- Code 64 identifies the slots that support DDSS consoles.

Program 28
- Assigns DDSS console(s) to telephones.

Program 29
- Assigns button functions for DDSS consoles.

5.20 HDSS Console Connections

5.21 The HDSS console must be connected to the data pairs of circuits 7 and 8 on a PEKU in the Expansion Unit (via the MDF) with standard two-pair twisted, jacketed telephone cable. To accommodate the connection, the instrument end of the HDSS console cable should be terminated in a modular station connector block (RJ-11). Refer to Wiring Diagrams, Section **100-816-208**, for wiring/interconnecting details. The overall length of the cable run from the Expansion Unit (KSU) to the HDSS console must not exceed 500 feet (152 meters), if using 24 AWG cable. The HDSS console can operate with either an electronic or digital telephone (preferably an LCD model).

CAUTION!
When installing the HDSS console cable, do not run parallel to and within 3 feet of an AC power line. AC power lines should be crossed at right (90°) angles only. Avoid running HDSS console wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

5.22 HDSS Console Configuration. The following considerations should be made when installing an HDSS console:

- A PEKU PCB is required in the expansion unit for an HDSS console. (The **DSS** switch on the PEKU must be set to DSS.)
- Two PEKU ports are required for the HDSS console (always Circuits 7 and 8).
- The PESU does not support the HDSS console.
- A system must be configured with the Expansion Unit to support an HDSS console. Only one HDSS console can be installed in a system.

5.23 HDSS Programming Overview
Program 03
- Codes 23 and 24 identify the slot that supports a PEKU that interfaces with the HDSS console.

Program 28
- Assigns HDSS console to a telephone.

Program 29
- Assigns individual button functions for the HDSS console.

6 DOOR PHONE/LOCK CONTROL UNIT AND DOOR PHONE INSTALLATION

6.01 This section provides installation instructions for the digital door phone/lock control units (DDCB). It also includes installation instructions for the door phone (MDFB). Each DDCB can support as many as three door phones (MDFBs), or two MDFBs and one door lock.

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NOTE:
DK8 and DK16 do not support the HDCB.

6.02 DK8 and DK16 systems can be equipped with up to six MDFBs.

6.03 For DK8, DDCBs can only connect to Circuit 3 (Port 02) and Circuit 4 (Port 03).

6.04 For DK16, DDCBs can only connect to Ports 04 and 12. DDCBs can only connect to Circuit 5 (Port 04) of the Base Unit and/or Circuit 1 (Port 12) of a PDKU or KCDU in the Expansion Unit.

NOTE:
DDCBs cannot connect to the QSTU, KSTU, PSTU, PESU or PEKU.

6.10 DDCB and MDFB Cabling

6.11 Refer to Section **100-816-208** for DDCB and MDFB wiring/interconnecting details. For door lock control installation procedures, refer to Section **100-816-208**. The length of the cable run from the key service unit (KSU) to the MDFB (via the DDCB) must not exceed 1,000 feet (305 meters), if using 24 AWG cable (see Table 8-D).

NOTES:
1. *DDCB cable runs must not have the following:*
   - *Cable splits (single or double)*
   - *Cable bridges (of any length)*
   - *High resistance or faulty cable splices*
2. See Section **100-816-208** for secondary protector information.

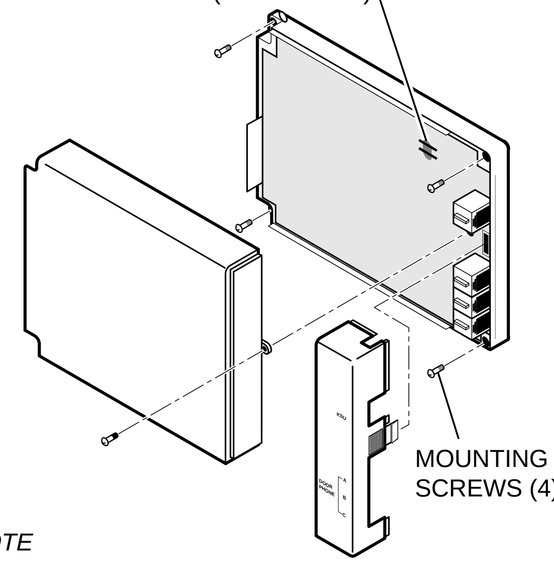
6.20 DDCB Wall Mounting

6.21 The DDCB is designed to be mounted on a wall or other vertical surface. Mount the units in accordance with the following steps:

1) Locate the two mounting holes on the right-hand side on the DDCB (Figure 6-16).

2) Remove the side cover from the DDCB to expose the two left-hand mounting holes (Figure 6-16).

3) Position the DDCB adjacent to the key service unit (KSU) with regard to wiring needs.



NOTE
*See **Table 8-D** regarding external power requirements.*

FIGURE 6-16
DOOR PHONE (DDCB) INSTALLATION

4) Secure the DDCB to the mounting surface with four one-inch panhead wood screws.

H

6.30 Door Phone (MDFB) Wall Mounting

6.31 Mount door phones (MDFBs) to a wall or vertical surface in accordance with the following steps:

1) Remove the screw from the bottom of the cover. Detach the cover from the base and metal frame (Figure 6-17).

2) Position the metal frame and base to the mounting surface and secure with two one-inch panhead wood screws (Figure 6-17).

3) Attach cover to the metal frame and base and secure with the screw which was removed in Step 1.

6.32 Door Phone Volume Control. Adjust the ring and voice volume to the MDFB in accordance with the following procedure:

1) Remove the screw from the bottom of the MDFB cover. Detach the cover from the base and metal frame (Figure 6-17).

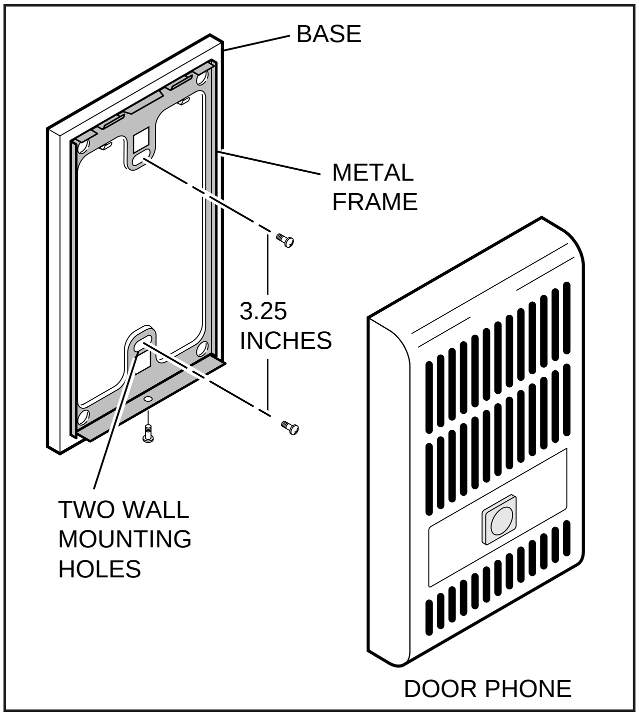


FIGURE 6-17
DOOR PHONE (MDFB) INSTALLATION

2) The volume level is changed by a screw adjustment on the back of the MDFB. Turn the screw with a flat-tipped screwdriver while ringing the MDFB or while on a call with it. The volume level will change as the screw is turned.

6.40 Door Phone/Lock Programming Considerations

6.41 The following programs should be considered when programming the system for door phones:

Program 39
- Assigns door phone and door lock buttons to digital telephones.

Program 77-1
- Assigns DDCBs to ports, door phone ringing over External Page during the NIGHT mode, and door lock activation time.

Program 77-2
- Used to busy out unused MDFB positions and to identify which DDCBs support the door lock option, and to set the door phone to ring one or five times.

Program 79
- Assigns door phone-to-station ringing assignments.

7 ADD-ON MODULE INSTALLATION

7.01 Install the Add-on Module (DADM 2020) to a 2000-series Digital Telephone (only) according to the steps that follow:

1) Loosen the four captive screws securing the 2000-series Digital Telephone base (Figure 6-1) and remove the base.

2) Remove the base handset hanger (Figure 6-1).

3) Loosen two captive screws securing ADM base and remove base.

4) Put on ADM cable (supplied with ADM) through telephone base and ADM base as shown in Figure 6-18.

5) Connect ADM cable connectors to P1 of ADM and P1 of DKT2000 telephone as shown in Figure 6-18.

6) Install base of ADM and telephone – tuck ADM cable into ADM and telephone base as necessary for proper length.

7) Secure ADM to telephone base with ADM connecting Plate (using four screws).

8) Check Table **8-D** in Section **100-816-208**; install 2-pair house cable (or external power) and 2-pair modular cord (supplied with ADM) if required to achieve maximum distance.

7.11 ADM Programming. ADMs do not require programming. The ADM provides 20 DSS buttons only (Figure 6-19) for the STRATA DK16, and 10 DSS buttons, 8 speed dial buttons, one night transfer button, and one all call page button (Figure 6-20) for the STRATA DK8. One ADM can be installed on any (or all) 2000-series telephone (16 max on DK16 or 8 max on DK8).

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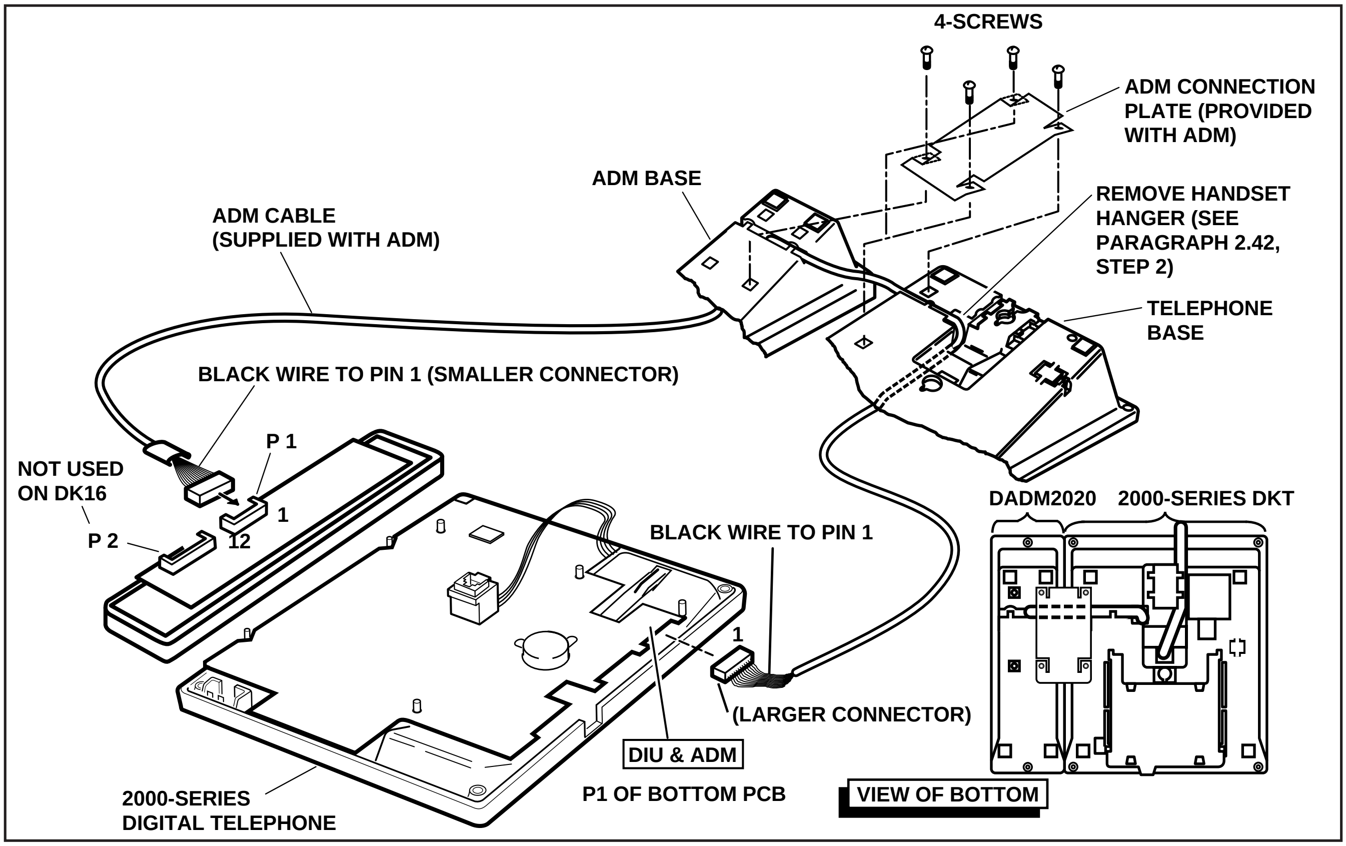


FIGURE 6-18
ADD-ON MODULE INSTALLATION

19	29
18	28
17	27
16	26
15	25
14	24
13	23
12	22
11	21
10	20

Note: This DSS button assignment is fixed and cannot be changed.

FIGURE 6-19
DK16 ADD-ON MODULE DSS BUTTON ASSIGNMENTS

19	Night Transfer
18	All Call Page
17	SD 17
16	SD 16
15	SD 15
14	SD 14
13	SD 13
12	SD 12
11	SD 11
10	SD 10

Note: The button assignments for DSS (10-19), Speed Dial (SD10 ~ 17), All Call Page, and Night Transfer button assignments are fixed and cannot be changed.

FIGURE 6-20
DK8 ADD-ON MODULE DSS BUTTON ASSIGNMENTS

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Strata® DK8 & DK16

INSTALLATION

CHAPTER SEVEN
PERIPHERAL INSTALLATION

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TABLE OF CONTENTS

FIGURE LIST

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FIGURE LIST

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1 GENERAL

1.00 This chapter provides procedures necessary to connect optional peripheral equipment to the STRATA DK8 or DK16. The installation instructions for each peripheral option include hardware requirements, printed circuit board (PCB) configuration, interconnection/wiring requirements, and programming considerations, as applicable.

1.01 Peripheral equipment is connected to the Base Unit itself and PCBs located in the Base Unit and Expansion Unit on the DK16. On the DK8, peripheral equipment connects to the KSU. Refer to Section 100-816-204 for Key Service Unit installation instructions, PCB installation instructions, and PCB configuration information for the DK8. Refer to Section 100-816-205 for Base Unit and Expansion Unit installation instructions, PCB installation instructions, and PCB configuration information for the DK16.

1.02 Wiring diagrams for each peripheral are located in this chapter.

2 MUSIC-ON-HOLD/BACKGROUND MUSIC OPTIONS

2.00 STRATA DK8 and DK16 systems provides a Music-on-Hold option for CO lines and digital, electronic (DK16 only) and standard telephones connected to the system. A variety of Background Music options are also provided (refer to Figure 7-1).

2.10 DK8 and DK16 Music-on-Hold (MOH) Option

2.11 An external music source—such as a tape player or tuner—can be connected to the RCA jack (labeled MOH) on the STRATA DK8 or DK16. The MOH source can be controlled (on/off) by a relay option set in **Program 77-1**. The DK8 KSU and DK16 Base Unit relay can control the MOH source, or the DK16 night bell. The MOH source and MOH relay contact specifications are:

- **MOH Source Specifications**
  - Input Impedance: 600 ohms
  - Input Voltage (recommended levels)
    Minimum: 0.14 VRMS (-15 dBm)
    Maximum: 0.77 VRMS (0 dBm)
- **Relay Contact Specifications**
  - Voltage: 24VDC maximum
  - Current: 1 ampere maximum

IMPORTANT NOTICE!
MUSIC-ON-HOLD
In accordance with U.S. Copyright Law, a license may be required from the American Society of Composers, Authors, and Publishers (ASCAP), or other similar organization, if copyrighted music is transmitted through the Music-on-Hold feature of this telecommunications system. Toshiba America Information Systems, Inc., hereby disclaims any liability arising out of the failure to obtain such a license.

2.12 Music-on-Hold Installation. Install the Music-on-Hold option in accordance with the following steps (refer to Figure 7-1):

1) Connect the external music source to the MOH RCA jack on the DK8 KSU or DK16 Base Unit.

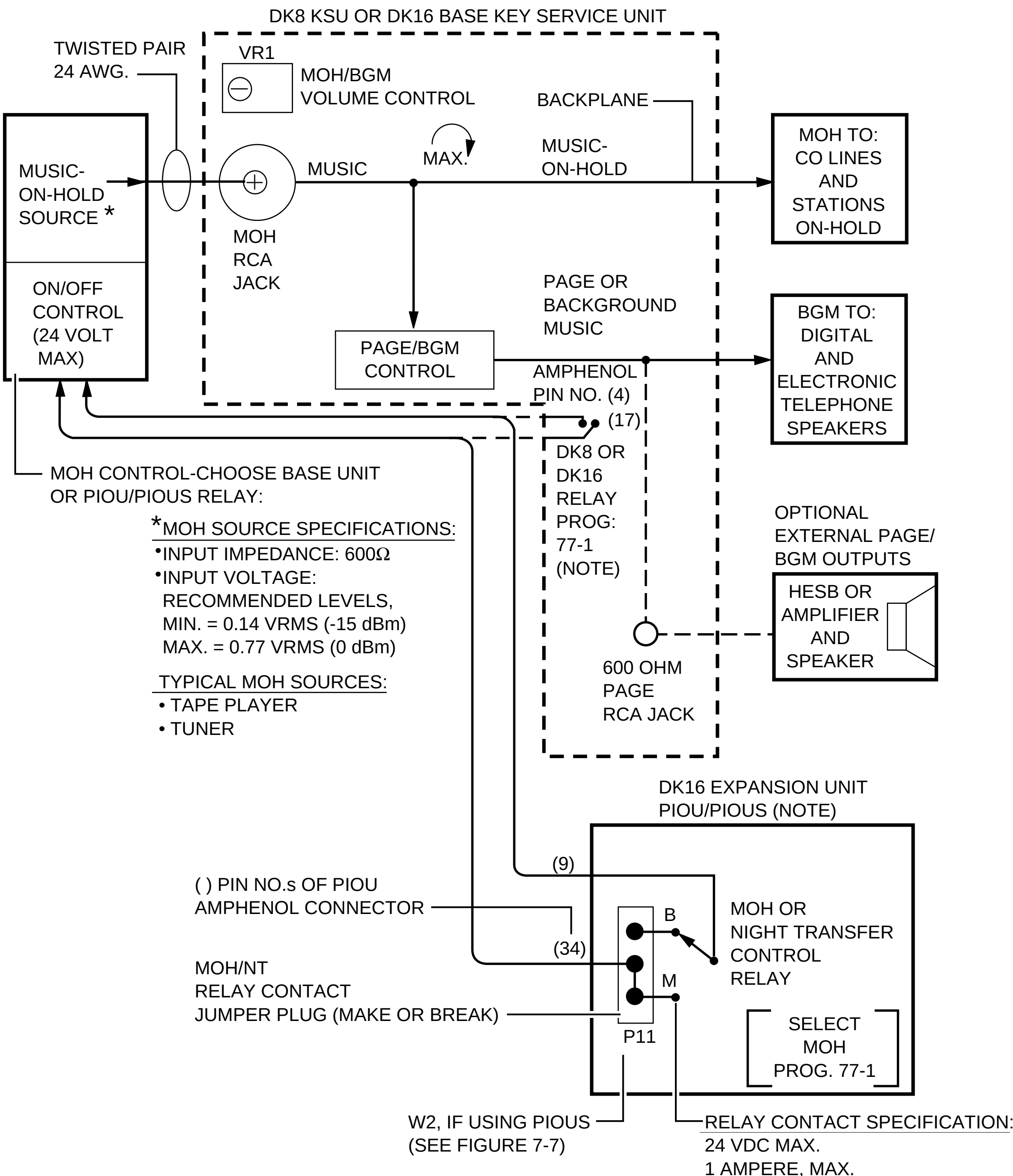
2) Rotate the MOH volume control (**VR1**) on the Base Unit to adjust Music-on-Hold volume: clockwise increases volume; counterclockwise decreases volume. Listen to the CO line on-hold when setting MOH to the proper volume.

3A) If MOH relay control is required in DK8, the MOH relay is selected in **Program 77-1.** Follow program instructions to make selection. This will short pins 42 and 17 of the DK8 KSU or DK16 Base Unit amphenol connector when MOH is activated by a CO line on hold.

3B) If MOH relay control is required in DK16, the Base Unit or the PIOU/PIOUS relay may be selected in **Program 77-1**. Follow Program instruction to make the selection.

4A) Set PIOU jumper plug **P11** to **MAKE** or **BREAK** position as required:
- **MAKE (M)**—Shorts the normally open contacts (pins 9 and 34) when MOH is activated.
- **BREAK (B)**—Opens the normally closed contacts (pins 9 and 34) when MOH is activated.

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NOTE:
*DK8 KSU relay or DK16 Base Unit relay can be programmed (**77-1**) as the MOH control relay: or in DK16 the PIOU MOH/NT relay can be used to control MOH.*

FIGURE 7-1
DK8 AND DK16 MUSIC-ON-HOLD AND BACKGROUND MUSIC FUNCTIONAL DIAGRAM
(SEE MDF WIRING DIAGRAM FOR DETAILS)

4B) Solder PIOUS jumper **W2** to **MAKE** or **BREAK** position if required:
- **MAKE (M)**—Shorts the normally open contacts (NHT and NHR) when any CO line is in the hold condition.
- **BREAK (B)**—Opens the normally closed contacts (NHT and NHR) when any CO line is in the hold condition.

5) For DK8 and DK16, MOH is sent to any station or CO line that is on hold.

6) MOH is also applied through the Page/Background Music (BGM) control to provide BGM to electronic/digital telephone speakers and external page (refer to Paragraph **2.20**).

2.20 Background Music (BGM) Options

2.21 The Background Music options allow music to play over optional external speakers (external page system) and/or electronic and/or telephone speakers. The system allows BGM to be configured any of the three ways described below:

1) Configuration A (DK8 and DK16)—one music source: This configuration allows BGM and MOH to share the same music source (see Figure 7-3). With this configuration, the MOH/BGM music source is connected to the MOH RCA jack on the DK8 KSU or DK16 Base Unit. The music source is sent to CO lines/stations on hold, to electronic/digital telephone speakers with BGM turned on (via **Intercom 481** or **Tel Set Music** button), and to the external page system via the 600 ohm RCA jack on the DK8 KSU or DK16 Base Unit.

2) Configuration B—two music sources: This configuration allows the MOH source to be connected to the MOH jack on the DK8 KSU or DK16 Base Unit (as in Configuration A) and a separate BGM source to be connected to a designated circuit on either a QSTU (circuit 2, Port 19), PEKU (circuit 3), PESU (circuit 8), PSTU, or KSTU (circuit 4)—see Figure 7-4. With this configuration, the MOH source is sent only to CO lines/stations on hold, while the BGM source is sent directly to electronic/digital telephone speakers and to the external page system via the 600 ohm RCA jack on the DK8 KSU or DK16 Base Unit.

3) Configuration C (DK16 only)—three music sources: This configuration allows the MOH source to be connected to the MOH jack on the Base Unit (as in Configuration A). The digital or electronic telephone BGM source is connected to a designated circuit on the PEKU, PESU, PSTU, or KSTU (as in Configuration B), and a separate BGM source is sent to the external page speakers via the PIOU Zone relay contacts (see Figure 7-5). When a separate BGM source is connected to the PIOU, two customer-supplied amplifiers are required to drive the external speakers. One amplifier (1) drives the speakers for BGM when page is idle and the other amplifier (2) drives the speakers during page.

2.22 MOH Source as Background Music Installation (DK8 and DK16). Install the MOH/Background Music option in accordance with the following steps (refer to Figure 7-1):

1) Ensure that the Music-on-Hold option is installed in accordance with Paragraph **2.12**.

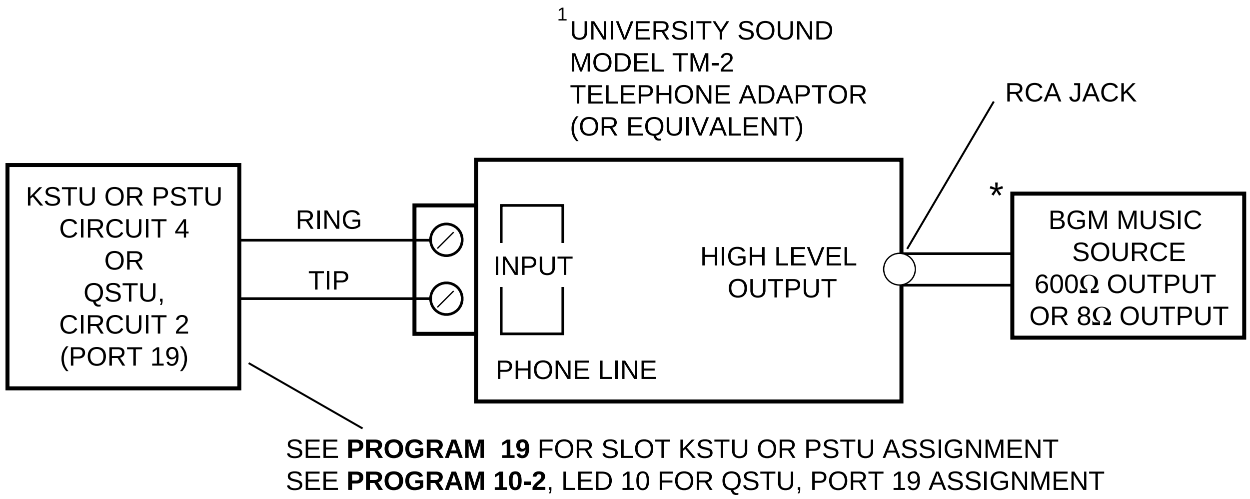
2) The output of the MOH RCA jack is applied to the 600 ohm PAGE RCA jack output**.**

3) When using an HESB or external amplifier for paging/BGM, adjust volume using the HESB or amplifier volume control.

2.23 Alternate BGM Source Installation A BGM source can be connected to either a QSTU, PSTU, KSTU, PEKU, or PESU. This music will be sent to all electronic/digital telephone speakers and to the external page system via the 600 ohm PAGE RCA jack on the DK8 KSU or DK16 Base Unit. This BGM source is separated from the MOH source connected to the MOH RCA jack on the DK8 KSU or DK16 Base Unit. Connect the BGM source to the QSTU, PSTU, KSTU, PEKU or PESU in accordance with the following steps (Figure 7-4):

NOTE:
If connecting the BGM source to the KSTU, PSTU, or QSTU PCB, a telephone adaptor matching/isolation transformer should be installed between the source and the PCB to protect the source from potentially ruinous voltages generated by the PCB (see Figure 7-2).

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NOTE:
1. UNIVERSITY SOUND
1327 Ralston Avenue
Sylmar, Ca. 91342-7607
Phone: (818) 362-9516

*BGM SOURCE SPECIFICATIONS:
- INPUT IMPEDANCE: 600Ω
- INPUT VOLTAGE:
  RECOMMENDED LEVELS,
  MIN. = 0.14 VRMS (–15 dBm)
  MAX. = 0.77 VRMS (0 dBm)

FIGURE 7-2
DK16 BGM SOURCE/STANDARD TELEPHONE CIRCUIT PRECAUTION DIAGRAM

1) For DK16, enter the programming mode and identify the BGM slot number in Program 19 of the printed circuit board (KSTU, PSTU, PEKU, and PESU) which the BGM source will be connected to.

2) Connect the BGM source to the tip and ring of the appropriate circuit of the BGM PCB: KSTU or PSTU (circuit 4), PEKU (circuit 3), and PESU (circuit 8). In Program 10-2, use LED 09 or 10 to specify the circuit number PEKU or PESU. KSTU or PSTU does not require Program 10-2 assignment.

2A) For DK8, enter the programming mode and set **LED 10** to on in **Program 10-2**. This assigns QSTU circuit 2, Port 19 as the BGM source for the system. You must cycle system power for **Program 10-2** to take effect.

3) If BGM is connected to PEKU or PESU, cut **W5** on the PEKU or **W7** on the PESU PCB that BGM is connected to.

4) Using the BGM source's volume control, adjust the BGM volume to the desired level while listening to BGM via an digital or electronic telephone speaker and/or the external page speakers. When BGM is sent to external speakers via the 600 ohm RCA jack PCB, use the external amplifier volume control to balance the BGM and page volume levels.

2.24 External Background Music Installation. The external background music options are closely associated with the external paging options. Refer to Paragraph **5** for external paging amplifier installation.

3 RELAY CONTROL OPTIONS

3.00 General

3.01 The DK8 KSU and DK16 Base Unit provides one relay, and the PIOU and PIOUS each provides two relays that control peripheral options.

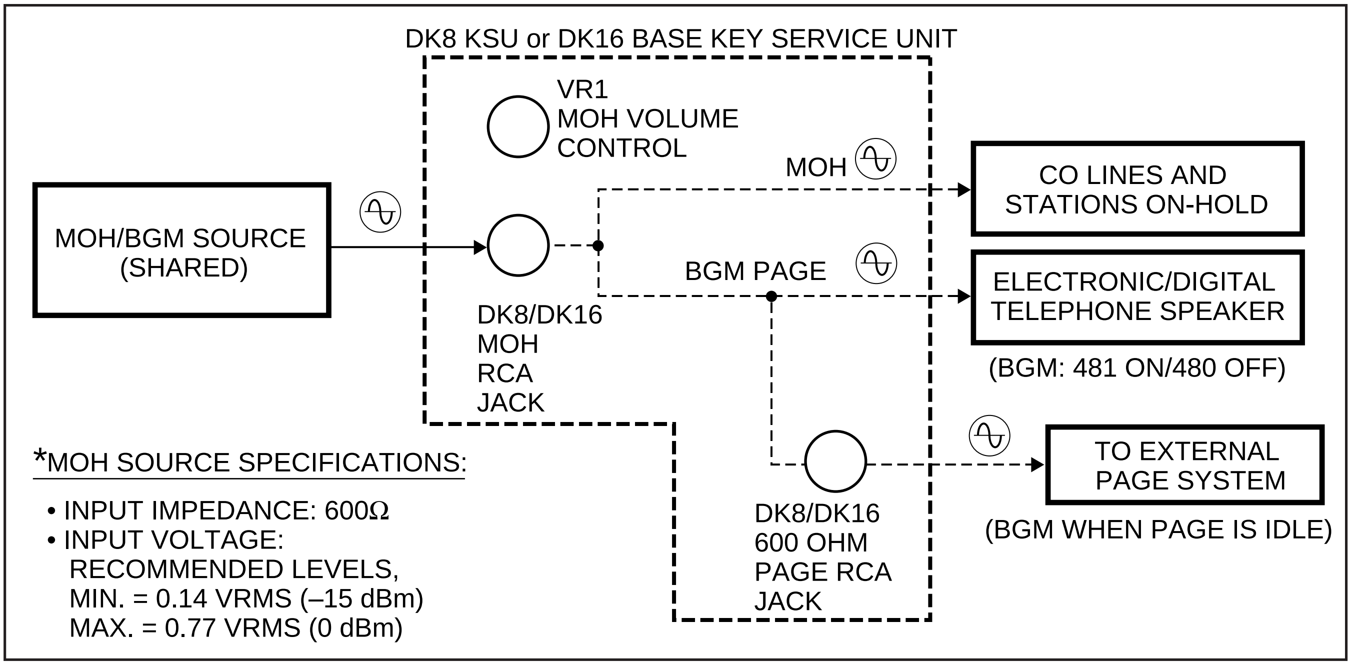


FIGURE 7-3
DK8 AND DK16 MUSIC SOURCE CONFIGURATION A

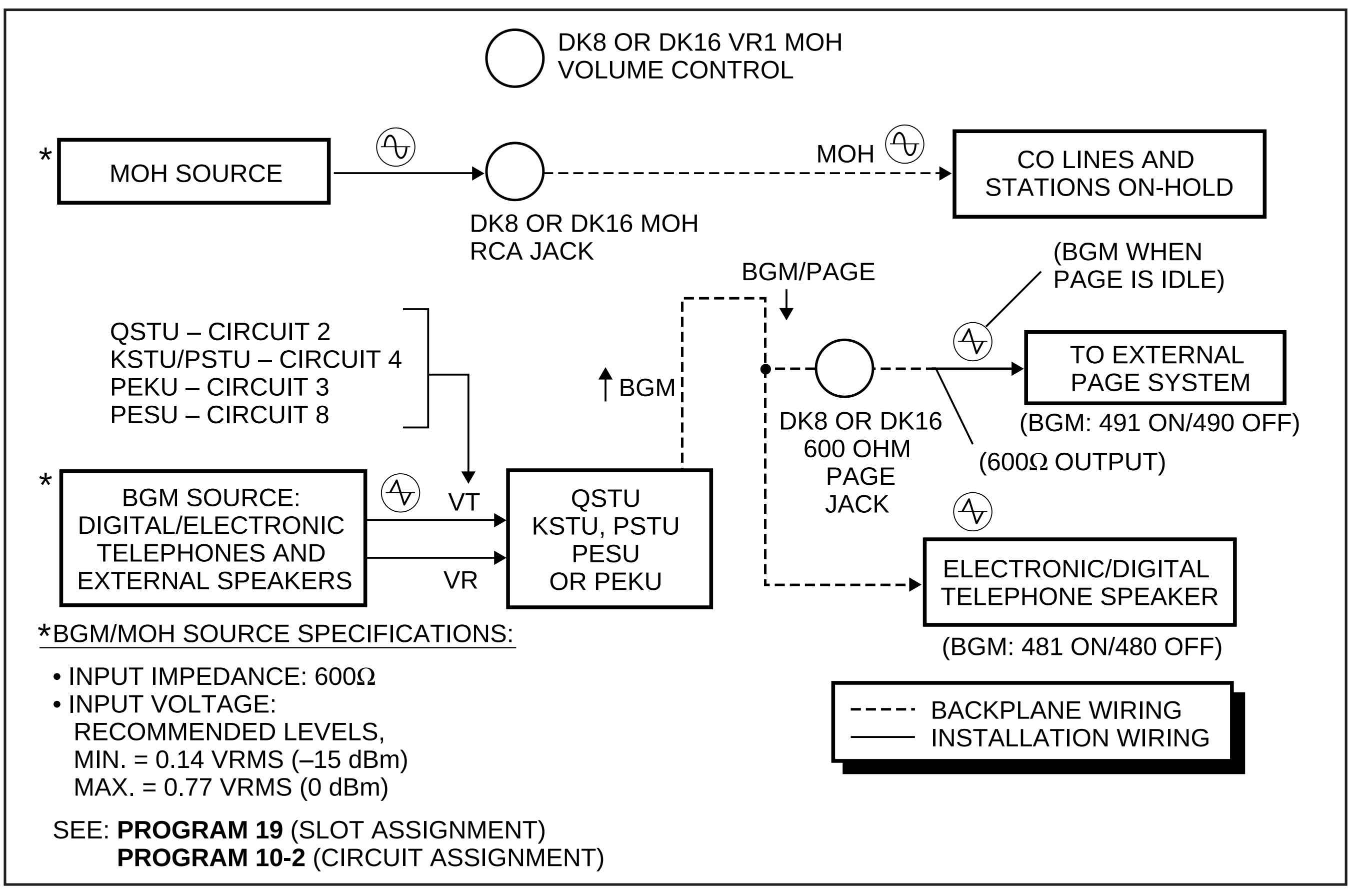


FIGURE 7-4
DK8 AND DK16 MUSIC SOURCE CONFIGURATION B

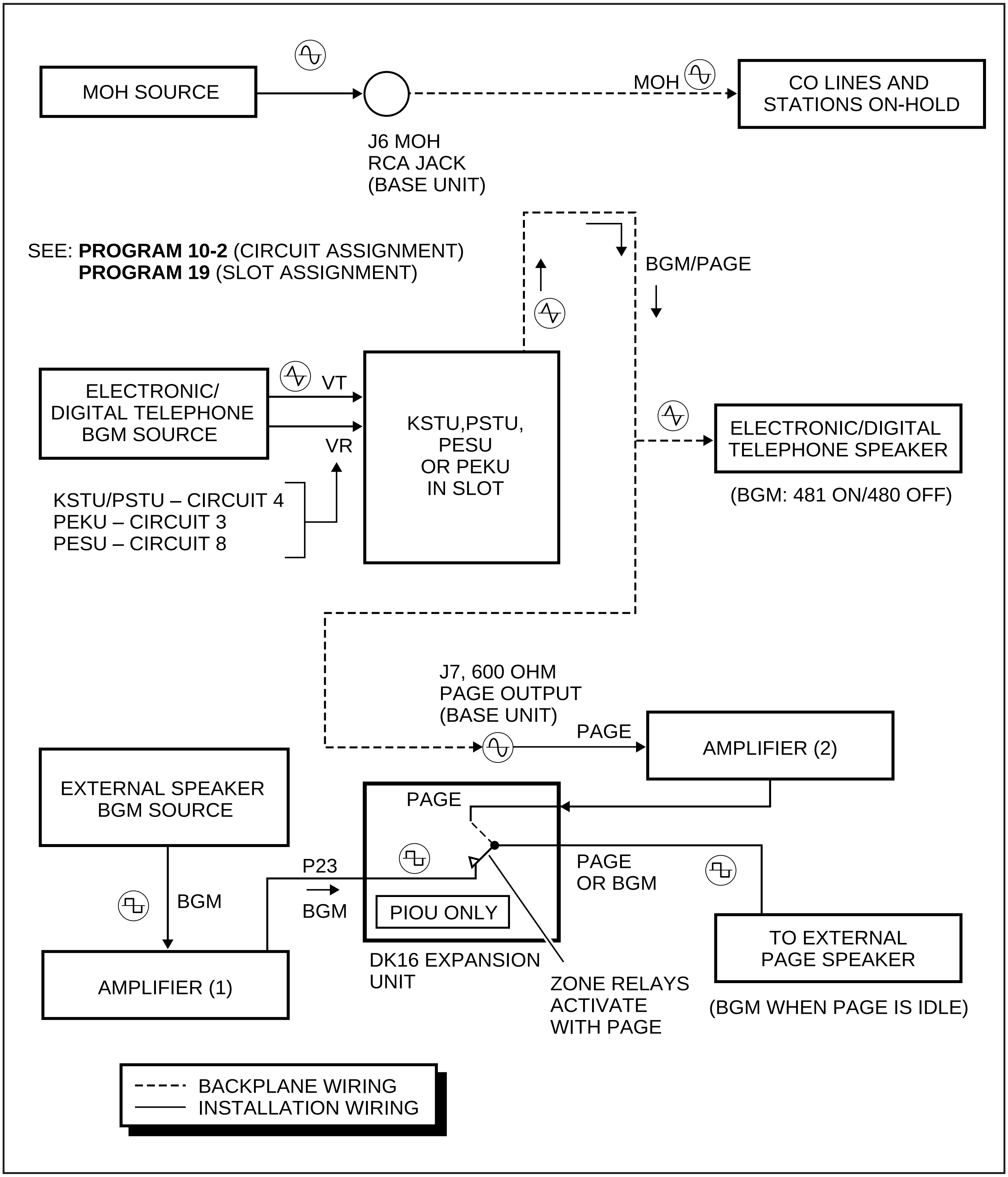


FIGURE 7-5
DK16 MUSIC SOURCE CONFIGURATION C

3.10 DK8 KSU and DK16 Base Unit Relay

3.11 The DK8 KSU or DK16 Base Unit Relay can be programmed for one of three options:

- BGM mute
- Night transfer
- MOH source control

These options are set in **Program 77-1** (LED 01 and 02). Only one option is allowed per installation. However, in the DK16, these options can be supplemented with PIOU/PIOUS relay options. Refer to Chapter 8 for wiring/interconnecting details. Electrical specifications for the relay contacts are as follows:

Voltage

- 24VDC maximum

Current

- 1 ampere maximum
- Normally open—closed when activated

3.20 DK16 Expansion Unit PIOU and PIOUS Relays

3.21 The Expansion Unit via the PIOU or PIOUS provides two additional relays that control peripheral options (see Figures 7-6, 7-7, 8-23, and 8-25).

- Door Lock Relay/BGM mute
- Night Transfer/Music-on-Hold Relay

NOTE:
The above relay options are available in conjunction with the Base Unit relay option.

3.22 Each relay may be configured as normally open (make) or normally closed (BREAK). Electrical specifications for the relay contacts are as follows:

Voltage

- 24VDC maximum

Current

- 1 ampere maximum

CAUTION!
Do not connect relays directly to 120VAC power source.

3.23 Door Lock Control (PIOU or PIOUS). Configure the PIOU or PIOUS for the door lock control function in accordance with the following steps (refer to Figure 7-6 and 7-7):

NOTE:
Only one door lock control is available using an optional interface PCB (PIOU or PIOUS), because only one interface PCB is allowed .

1) Access **Program 77-1**. Set **LED 07** for the door lock control function.

2) Access **Program 77-1**. Set **LED 20** to **OFF** for a 3-second door lock activation time, or set **LED 20** to **ON** for a 6-second door lock activation time.

3A) Set the **P10** jumper plug on the PIOU to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (pins 7 and 32) when a station's door lock button is pressed.
- **BREAK**—Opens the normally closed contacts (pins 7 and 32) when a station's door lock button is pressed.

3B) Solder the **W1** jumper plug on the PIOUS to the **MAKE** or **BREAK** position as required:
- **MAKE—**Shorts the normally open contacts (DET and DER) when a station's door lock button is pressed.
- **BREAK—**Opens the normally closed contacts (DET and DER) when a station's door lock button is pressed.

4) Refer to Figure 7-8 for wiring/interconnecting details. Connect the PIOU or PIOUS to the MDF as required for the door lock control function.

3.24 DK8 and DK16 DDCB Door Lock Control. In addition to the door lock control provided by the PIOU or PIOUS (DK16 only), each door phone/lock control box (DDCB) installed provides one door lock control. Only two DDCBs can be installed in a system: On DK8 a DDCB can be connected to Circuit 3 (Port 02) and/or Circuit 4 (Port 03); on DK16 a DDCB can be connected to the circuit 5

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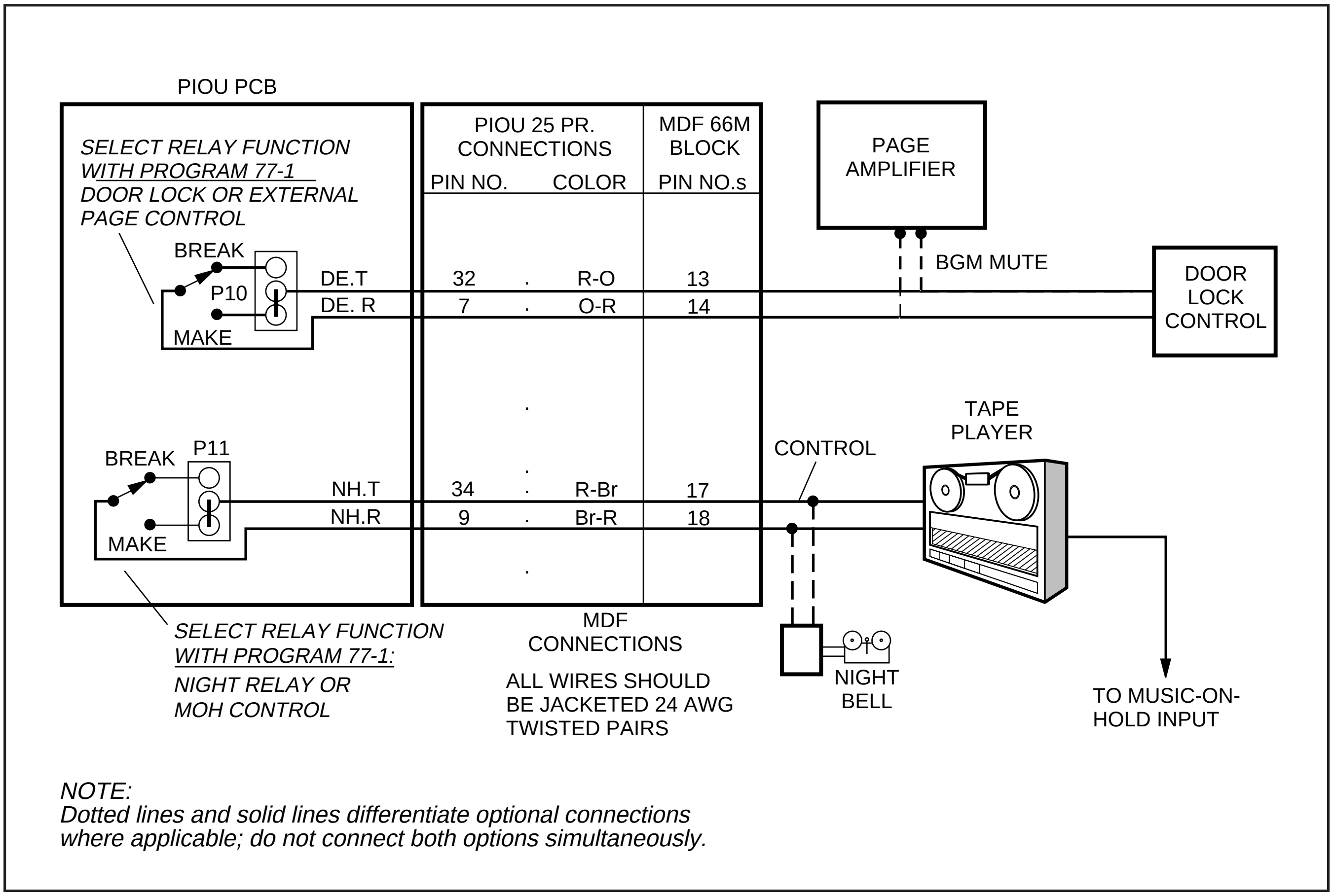
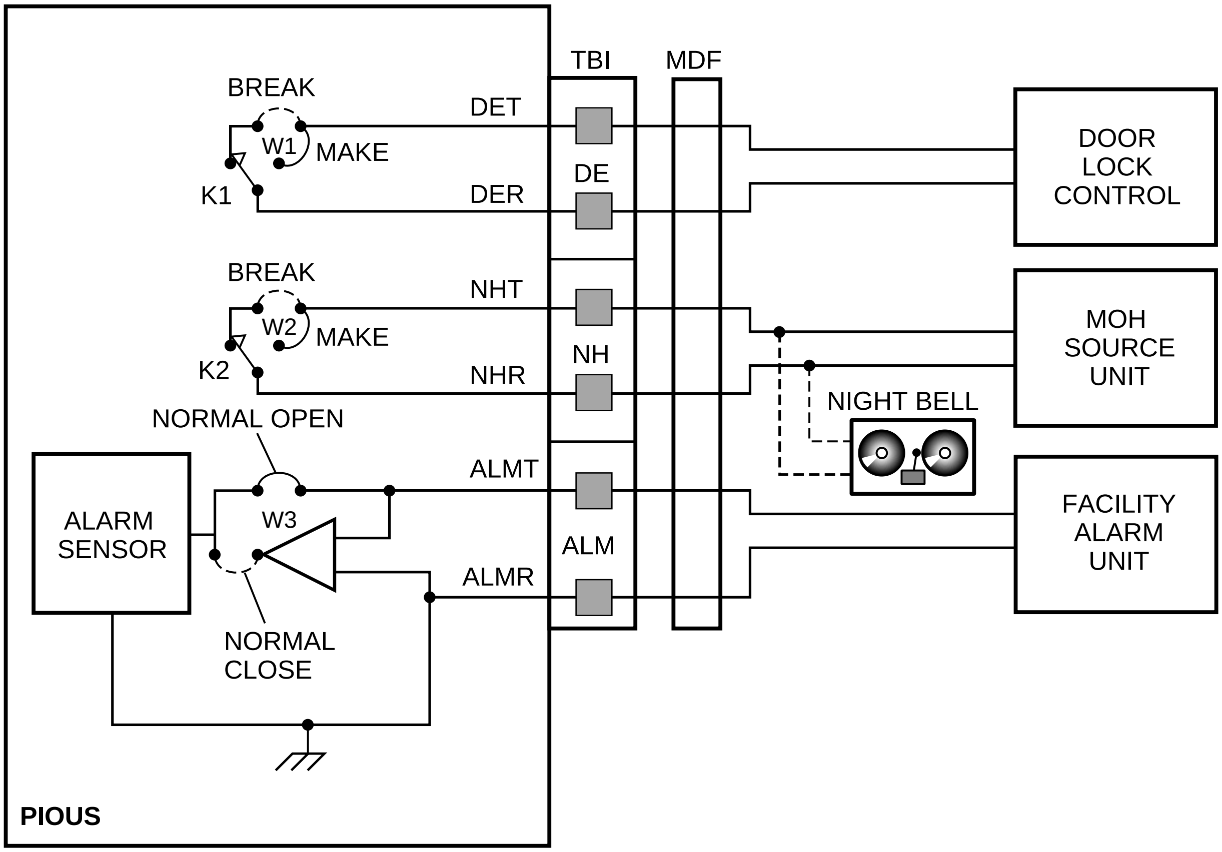


FIGURE 7-6
DK16 PIOU RELAY CONTROL FUNCTIONAL WIRING DIAGRAM

(Logical Port 04) of the Base Unit Digital telephone circuit set and to circuit 1 of the KCDU or PDKU (Logical Port 12) in the Expansion Unit. Each DDCB door lock control installed reduces the system door phone capacity of six by one. Any electronic or digital telephone can be equipped with a button for each of the door locks. Install each DDCB door lock control as follows:

DDCB Installation

1) On DK8, connect applicable digital telephone circuit (Logical Port 02 or 03) to the DDCB KSU modular jack (see Figure 7-9 and Figure 8-4).
2) On DK16, connect the applicable digital telephone circuit (Logical Port 04 or 12) to the DDCB HKSU modular jack (see Figure 7-9 and Figure 8-4).
3) On the DDCB, set SW1 to the DOOR position, and SW2 to the LOCK position.
4) In **Program 77-1**, set the door unlock activation for three or six seconds, and enable the applicable port for DDCB connection, and specify if door phones should ring over external page at night.
5) In **Program 77-2**, enable the DDCB B-jack for door lock operation, and specify 1 or 5 rings when door button is pressed.
6) In **Program 79**, specify door phone ringing assignments.
7) In **Program 39**, assign Unlock Door buttons to the desired stations.
8) Check each Unlock Door button from each station: DDCB modular B-jack (pins 3 and 4) will momentarily close (three or six seconds) when the appropriate Unlock Door button is pressed.



- *All wiring connections must be 24 AWG twisted pairs.*

RELAY OPTIONS:

- K1 (DE): DOOR LOCK OR AMP MUTE CONTROL; PROGRAM 77-1, LED 07
- K2 (NH): NIGHT RELAY OR MUSIC-ON-HOLD CONTROL; PROGRAM 77-1, LED 05
- K1 & K2: 24VDC, 1 AMP MAXIMUM

FIGURE 7-7
DK16 PIOUS RELAY CONTROL FUNCTIONAL WIRING DIAGRAM

3.25 Door Lock Assignments Guide

Host	Port No.	Door Lock No.	Prog. 39 Assignments
DK16 PIOU/PIOUS	N/A	0 Unlock Door 0	Code 71
Ckt 5 DK16 Base Unit DDCB	04	1 Unlock Door 1	Code 72
Ckt 3 DK8 KSU DDCB	02		
Ckt 1 Expansion Unit (PDKU or KCDU)	12	2 Unlock Door 2	Code 73
Ckt 4 DK8 KSU DDCB	03		
Note: CKT1 must be used in installing DDCB on KCDU or PDKU. (Must be in Port 12)			

3.30 DK16 Expansion Unit Night Transfer/ Music-on-Hold Relay Options with PIOU or PIOUS

3.31 The NHT/NHR relay may be programmed for either the night relay or the MOH relay function (refer to Figures 7-6 and 7-7). These functions can be provided in addition to the relay service provided by the Base Unit.

3.32 When configured for the night transfer function with **Program 77-1**, the relay activates if the system is in the NIGHT mode. The relay may be

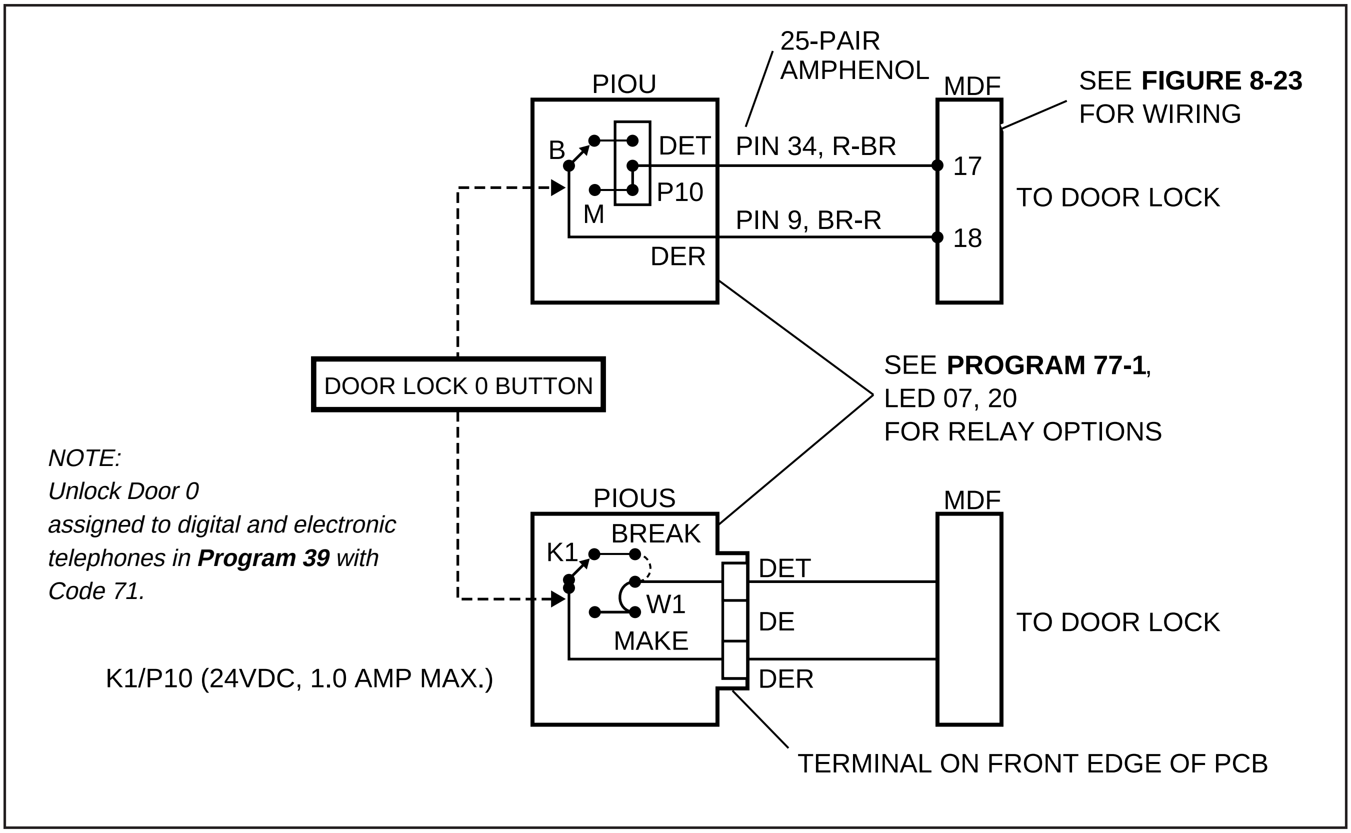


FIGURE 7-8
DK16 DOOR LOCK CONTROL OPTION (PIOU/PIOUS)

programmed to activate continuously when the **Night Transfer 1** button (only) is set to NIGHT mode (for indirect answering machine control); or to pulsate at 1-second ON/3-seconds OFF (for a night bell) when incoming CO lines night ring over external page (**Program 78-13**) (**NT1** = tenant 1 CO lines; **NT2** = tenant 2 CO lines) per **Program 15**.

3.33 When configured for the Music-on-Hold function with **Program 77-1**, the relay activates any time a CO line is on hold. In this configuration, the relay is normally used to control the Music-on-Hold source.

3.34 DK16 Night Transfer Relay Control. Configure the PIOU or PIOUS for the Night Transfer Relay function in accordance with the following steps (refer to Figures 7-6 and 7-7):

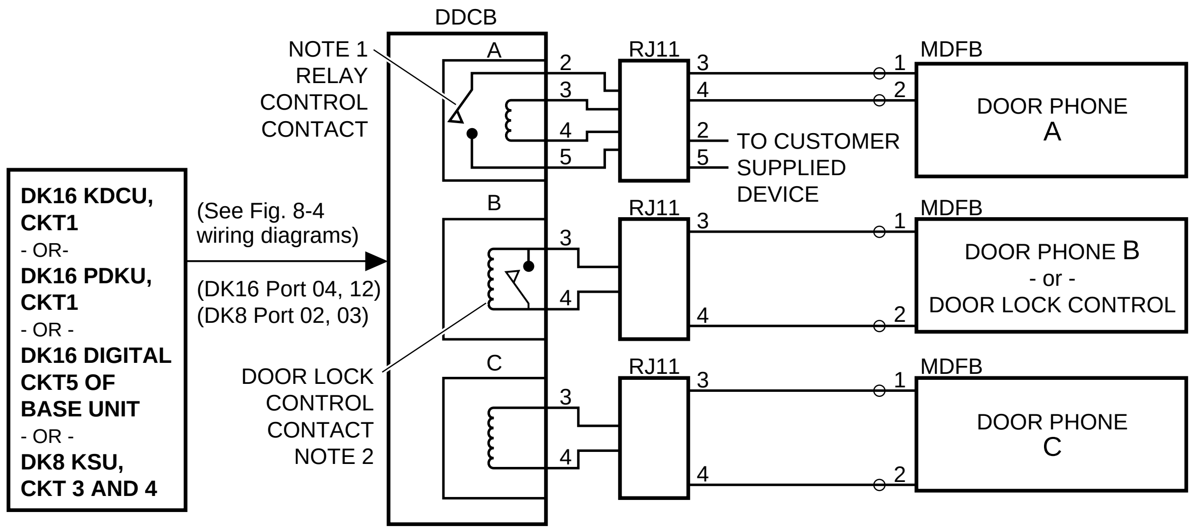
1) Access **Program 77-1**. Set **LED 05** to **OFF** to configure the Night/Hold Relay for the Night Relay function.

2) Access **Program 77-1**. Set **LED 06** to provide continuous or pulsating relay activation as follows:
   - **OFF**—Programs the relay for continuous activation when **NT1** button (only) is set.
   - **ON**—Programs the relay for pulsating activation when the **NT1** or **NT2** button is set to NIGHT mode and a tenant 1 or tenant 2 CO line rings.

NOTE:
*CO lines must be enabled in **Program 78-13** for the NT pulsating relay function.*

3) Access **Programs 87**, **88**, and **89** to set the CO lines that will activate the relay (when the system is in the NIGHT mode).

4) Access **Program 39** to program a **Night Transfer** button (**NT1** or **NT2**) on all telephones that are to transfer the system into the NIGHT mode.



DDCB TO DK8 KSU WIRING CHART

PORT NO.	DK8 AMPHENOL	TO	DDCB KSU JACK
02	DT (30) / DR (5) PT (31) / PR (6)	TO TO	PIN 3 / 4 PIN 5 / 6
03	DT (32) / DR (7) PT (33) / PR (8)	TO TO	PIN 3 / 4 PIN 5 / 6

DDCB TO DK16 BASE UNIT WIRING CHART

BASE UNIT AMPHENOL	TO	DDCB KSU JACK
DT (34) / DR (9)	TO	PIN 3 / 4
PT (35) / PR (10)	TO	PIN 5 / 6

DDCB TO DK16 EXPANSION UNIT WIRING CHART

KCDU OR PDKU	TO	DDCB KSU JACK
DT (26) / DR (1)	TO	PIN 3 / 4
PT (27) / PR (2)	TO	PIN 5 / 6

NOTES

1. *Relay control contact will close when the door phone is in the ringing, talk, or monitor state.*
2. *See Paragraph* ***4.25*** *for Door Lock assignments.*
3. *Relay contact specifications are -24VDC at 1.0 amp. max. Do not connect relay contacts to 120 AC commercial power.*

See **Figure 8-4** for DK16 Base Unit, PDKU, and KCDU pin-out information

FIGURE 7-9
DK8 AND DK16 DOOR LOCK CONTROL OPTION (DDCB)

5) Access **Programs 29-1** ~ **29-2** to program a **Night Transfer** button (**NT1** or **NT2**) on all DSS consoles that are to transfer the system into the NIGHT mode.

6) If tenant operation is required, access **Program 15** to set the CO lines for tenant 1 (**NT1**) or tenant 2 (**NT2**) operation.

7A) Set the **P11** jumper plug on the PIOU to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (pins 9 and 34) when the night relay is activated.
- **BREAK**—Opens the normally closed contacts (pins 9 and 34) when the night relay is activated.

7B) Solder the jumper **W2** on the PIOUS to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (NHT and NHR) when the night relay is activated.
- **BREAK**—Opens the normally closed contacts (NHT and NHR) when night relay is activated.

8) Refer to Figures 7-6 and 7-7 for wiring/interconnecting details. Connect the PIOU or PIOUS to the MDF as required for the night relay function.

NOTE:
*Door phones programmed to ring over external page in night mode (**Program 77-1**) do not activate the NT relay.*

3.35 DK16 Expansion Unit MOH Relay Control. Configure the PIOU or PIOUS for the MOH relay function in accordance with the following steps (refer to Figures 7-6 and 7-7):

1) Access **Program 77-1**. Set **LED 05** to **ON** to configure the Night/MOH relay for the MOH relay function.

2A) Set the **P11** jumper plug on the PIOU to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (pins 9 and 34) when any CO line is on hold.
- **BREAK**—Opens the normally closed contacts (pins 9 and 34) when any CO line is on hold.

2B) Solder the **W2** jumper on the PIOUS to the **MAKE** or **BREAK** position, as required:
- **MAKE**—Shorts the normally open contacts (NHT and NHR) when any CO line is on hold.
- **BREAK**—Opens the normally closed contacts (NHT and NHR) when any CO line is in on hold.

3) Refer to Figures 7-6 and 7-7 for wiring/interconnecting details. Connect the PIOU or PIOUS to the MDF as required for the MOH relay function.

4 EXTERNAL SPEAKER UNIT (HESB) OPTIONS

4.00 STRATA DK8 and DK16 systems provide three options utilizing an HESB:

4.01 DK8 and DK16 Loud Ringing Bell Option. The Loud Ringing Bell option allows the voice first or ringing signal tone to be amplified without the use of other manufacturers' equipment. The voice first and ringing signal tones can be amplified on all 6500-series electronic telephones and 2000- and 1000-series digital telephones equipped with HHEU PCBs (refer to Section **100-816-206**). The HESB automatically turns off once the ringing call or voice first has been manually answered from the electronic or digital telephone. This turn-off feature prevents audio feedback problems.

4.02 Amplified Speaker Option. The Amplified Speaker option allows the HESB to be configured as a paging speaker. The HESB is connected to the 600 ohm Page RCA jack on the DK8 KSU or DK16 Base Unit to provide an amplified external speaker.

4.03 Talkback Amplified Speaker Option. The Talkback Amplified Speaker option allows a talkback speaker to be provided in areas where a telephone is not needed. In this configuration, the HESB is connected to the 600 ohm Page RCA jack on the DK8 KSU or DK16 Base Unit and is used as the amplifier and speaker. The door phone unit (MDFB) is connected to the HESB, and serves as a microphone to provide talkback operation. (The MDFB microphone is always on in this application so the pushbutton is inoperative, and the unit serves only as a microphone for talkback.)

NOTE:
The 600 ohm Page RCA jack is two-way (duplex) and is compatible with most commercially available talkback amplifiers.

4.10 System Hardware Requirements

4.11 System hardware requirements vary depending on the HESB option selected. Refer to the following installation procedures for the system hardware requirements for each option.

4.20 HESB Option Installation

4.21 Loud Ringing Bell Installation. Install the HESB Loud Ringing Bell option in accordance with the following procedures:

DK8 and DK16 HESB Installation for Digital Telephone Loud Ring Bell (Figure 7-10):

1) Connect a jumper between Terminals 2 and 10 on the HESB **TB1** terminal block.
2) Connect a jumper between Terminals 4 and 5 on the HESB **TB2** terminal block.

NOTES:
*1. HESB connections made in steps 3~5 may be accomplished using the HESB **VOICE** modular jack instead of the **TB1** terminal block.*

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2. *Install an HHEU PCB and HESC-65A cable in the telephone per Section* ***100-816-206*** *before proceeding with Step 3.*

3) Connect Terminal 1 of the HESB **TB1** terminal block to the red (+) wire of the HESC-65A using a modular block.

4) Connect Terminal 2 of the HESB **TB1** terminal block to the green (–) wire of the HESC-65A using a modular block.

5) Connect Terminal 8 of the HESB **TB1** terminal block to the yellow (L2) wire of the HESC-65A cable using a modular block.

6) Connect the HACU-120 power supply's **+12V** lead to Terminal 1 of the HESB **TB2** terminal block, and connect the power supply's **0V** lead to Terminal 2.

7) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

DK16 HESB Installation for Electronic Telephone Loud Ring Bell (Figure 7-11):

1) On the HESB **TB1** terminal block: connect a jumper between Terminals 6 and 7, and connect another jumper between Terminals 5 and 8.

2) On the HESB **TB2** terminal block, connect a jumper between Terminals 4 and 5.

NOTES:
1. *HESB connections made in steps 3~6 may be accomplished using the HESB* ***VOICE*** *modular jack instead of the* ***TB1*** *terminal block.*
2. *Install an HHEU PCB and HESC-65 (or HESC-65A) cable in the telephone per Section* ***100-816-206*** *before proceeding with Step 3.*

3) Connect Terminal 1 of the HESB **TB1** terminal block to the red (+) wire of the HESC-65 cable using a modular block.

4) Connect Terminal 2 of the HESB **TB1** terminal block to the green (–) wire of the HESC-65 cable using a modular block.

5) Connect Terminal 3 of the HESB **TB1** terminal block to pin 3 of the electronic telephone's modular block (VOICE TIP).

6) Connect Terminal 4 of the HESB **TB1** terminal block to Pin 4 of the electronic telephone's modular block (VOICE RING).

7) Connect the HACU-120 power supply's **+12V** lead to Terminal 1 of the HESB **TB2** terminal block, and connect the power supply's **0V** lead to Terminal 2.

8) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

4.22 Loud Ringing Bell Test. Test the Loud Ringing Bell installation in accordance with the following steps:

1) Make a CO or station call to the station configured for the loud ringing bell.
   - Ringing will be heard over the HESB.

2) Adjust the HESB volume control to the desired level. (Screwdriver adjustment on back of HESB and ring level control of associated telephone.)

3) If ringing is heard at the station, but not over the HESB, perform the following check while the station is ringing:
   a) Using a suitable voltmeter, measure voltage across terminals 1 (+) and 2 (-) of the HESB **TB1** terminal block.
      - Voltage indication should be 4.5 ~ 5.0 VDC.

NOTE:
Ringing stops once the call is manually answered. There should be NO voltage potential across terminals 1 and 2.

   b) If voltage is not as specified during ringing, check that the telephone wiring connections to the HESB have been made properly (wires to terminals 1 and 2 of the HESB **TB1** terminal block may have been reversed).

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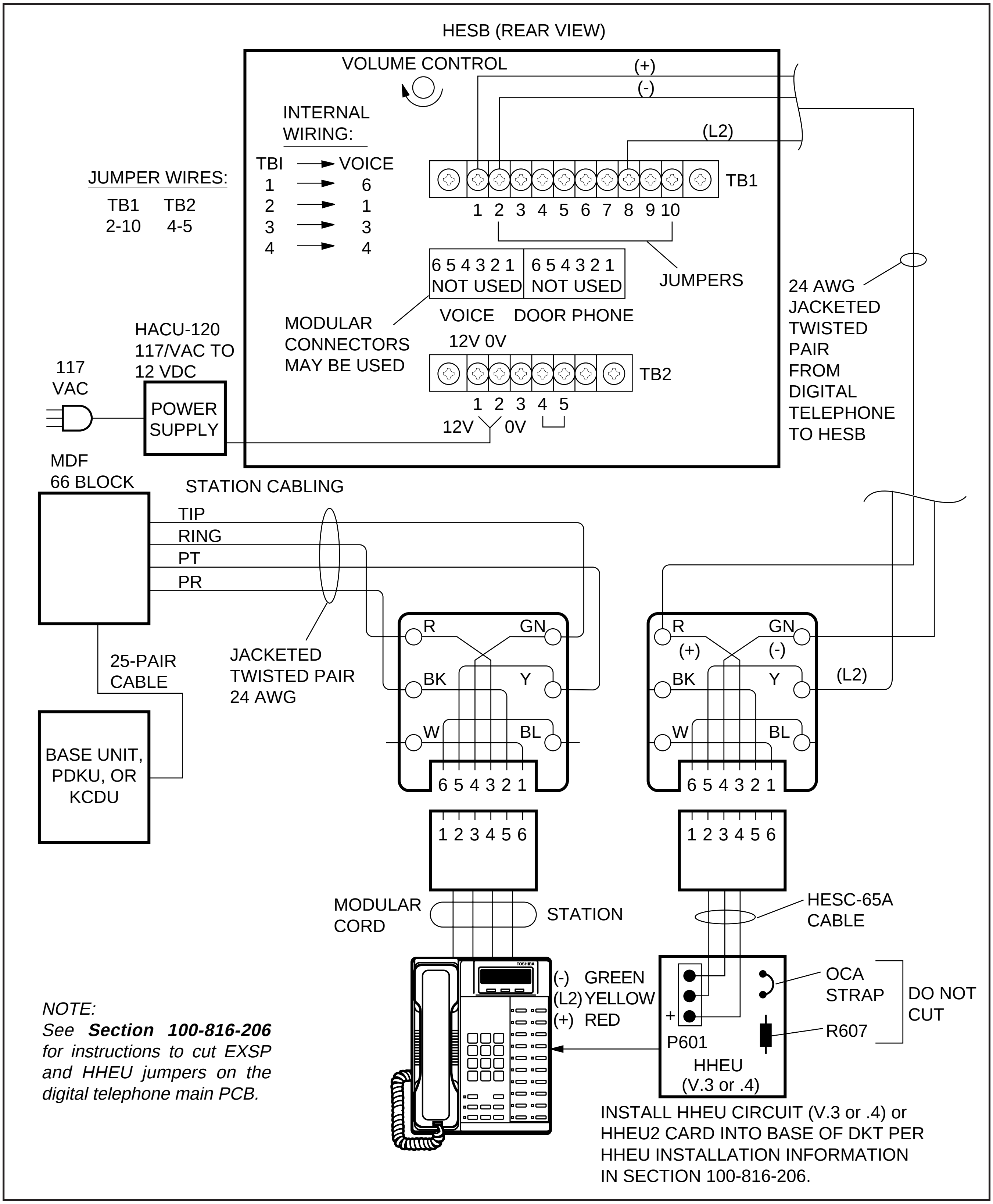


FIGURE 7-10
DK8 AND DK16 HESB/DIGITAL TELEPHONE WITH LOUD RINGING BELL WIRING

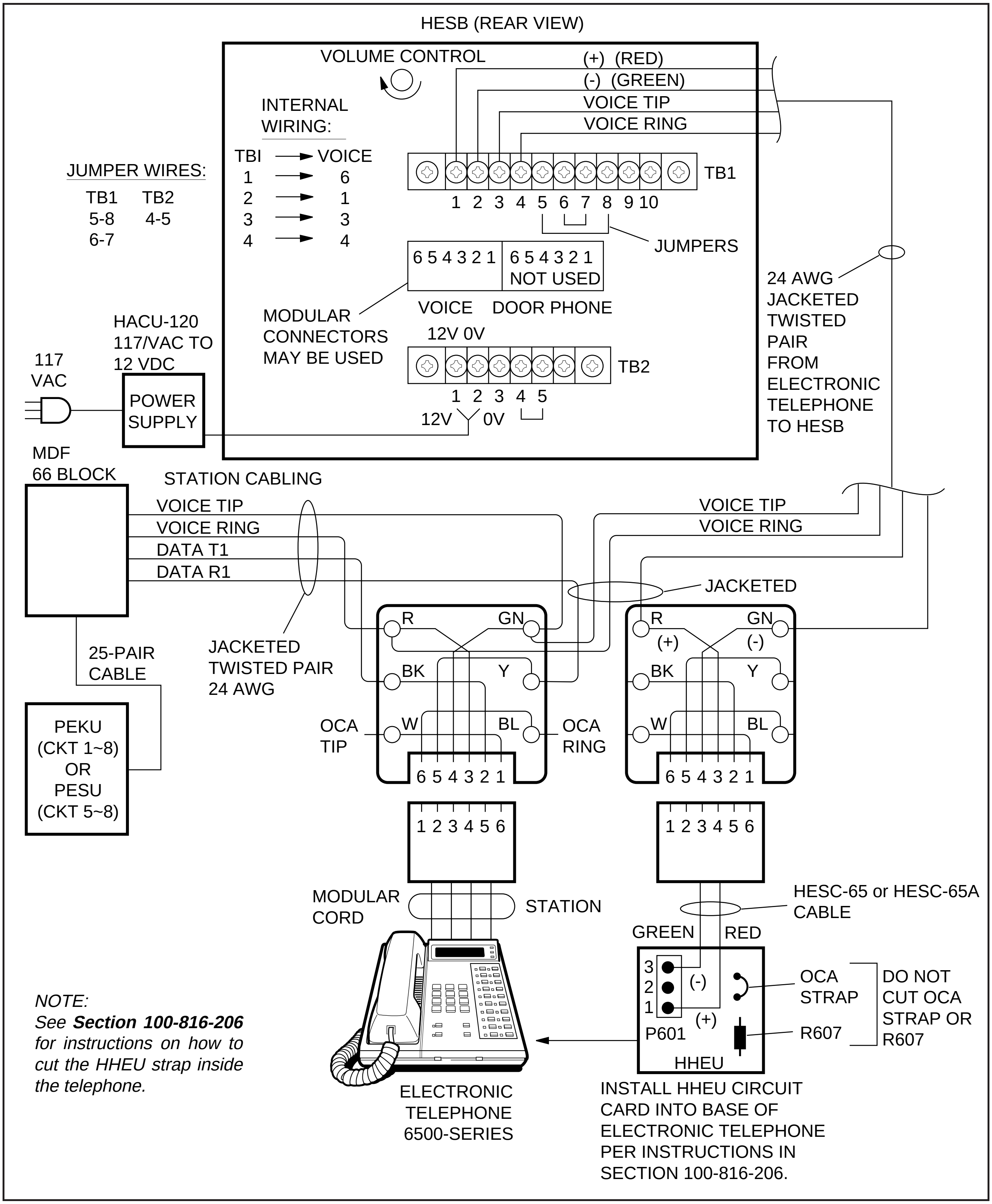


FIGURE 7-11
DK16 HESB/ELECTRONIC TELEPHONE WITH LOUD RINGING BELL WIRING

4.23 Amplified Speaker Installation. Install the HESB Amplified Speaker option in accordance with the following steps (refer to Figure 7-12):

1) Connect a jumper between terminals 1 and 2 of the HESB **TB1** terminal block.

2) Connect a jumper between terminals 6 and 7 of the HESB **TB1** terminal block.

3) Connect a jumper between terminals 5 and 8 of the HESB **TB1** terminal block.

4) Connect a jumper between terminals 3 and 4 of the HESB **TB2** terminal block.

5) Connect a jumper between terminals 5 and 6 of the HESB **TB2** terminal block.

6) Connect the 600 ohm PAGE RCA jack output on the DK8 KSU or DK16 Base Unit to terminals 3 and 4 of the HESB TB1 terminal block.

7) Connect the power supply's **+12V** lead to terminal 1 of the HESB **TB2** terminal block, and connect the **0V** lead to terminal 2.

8) Plug the provided power cord into the power supply and to a 117VAC, 60Hz power source.

4.24 Amplified Speaker Test. Test the amplified speaker installation in accordance with the following steps:

1) Make an external page.
   - Page should be heard over the HESB.

2) Adjust the HESB volume control to the desired level (screwdriver adjustment on back of HESB).

4.25 HESB/MDFB Talkback Amplified Speaker Installation. Install the HESB/MDFB Talkback Amplified Speaker option in accordance with the following steps (refer to Figure 7-13):

1) Connect a jumper between terminals 1 and 2 of the HESB **TB1** terminal block.

2) Connect a jumper between terminals 3 and 4 of the HESB **TB2** terminal block.

3) Connect a jumper between terminals 5 and 6 of the HESB **TB2** terminal block.

NOTE:
*HESB connections made in steps 4 ~ 7 may be accomplished using the HESB **VOICE** and **DOOR PHONE** modular jack instead of the **TB1** terminal block.*

4) Connect terminal 7 of the HESB **TB1** terminal block to pin L1 of the MDFB.

5) Connect terminal 8 of the HESB **TB1** terminal block to pin L2 of the MDFB.

6) Connect terminal 9 of the HESB **TB1** terminal block to pin 1 of the MDFB.

7) Connect terminal 10 of the HESB **TB1** terminal block to pin 2 of the MDFB.

8) Connect the 600 ohm PAGE RCA jack output from DK8 KSU or DK16 base unit to terminals 3 and 4 of the HESB TB1 terminal block.

9) Connect the HACU-120 Power Supply's +**12V** lead to terminal 1 of the HESB **TB2** terminal block, and connect the **0V** lead to terminal 2.

10) Plug the provided power cord into the power supply and to a 117 VAC, 60Hz power source.

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4.26 Talkback Amplified Speaker Test. Test the Talkback Amplified Speaker installation in accordance with the following steps:

1) Make an external page.
   - Page will be heard over the HESB.

2) Verify that someone speaking into the door phone can be heard at the paging station (with this application, pressing the door phone button is not required to talkback through the door phone).

4.27 HESB Wall Mounting Instructions. The HESB can be mounted to a wall or other vertical surface. Use the following instruction to mount the HESB (see Figure 7-14).

1) Find a suitable location on the mounting surface for the HESB.

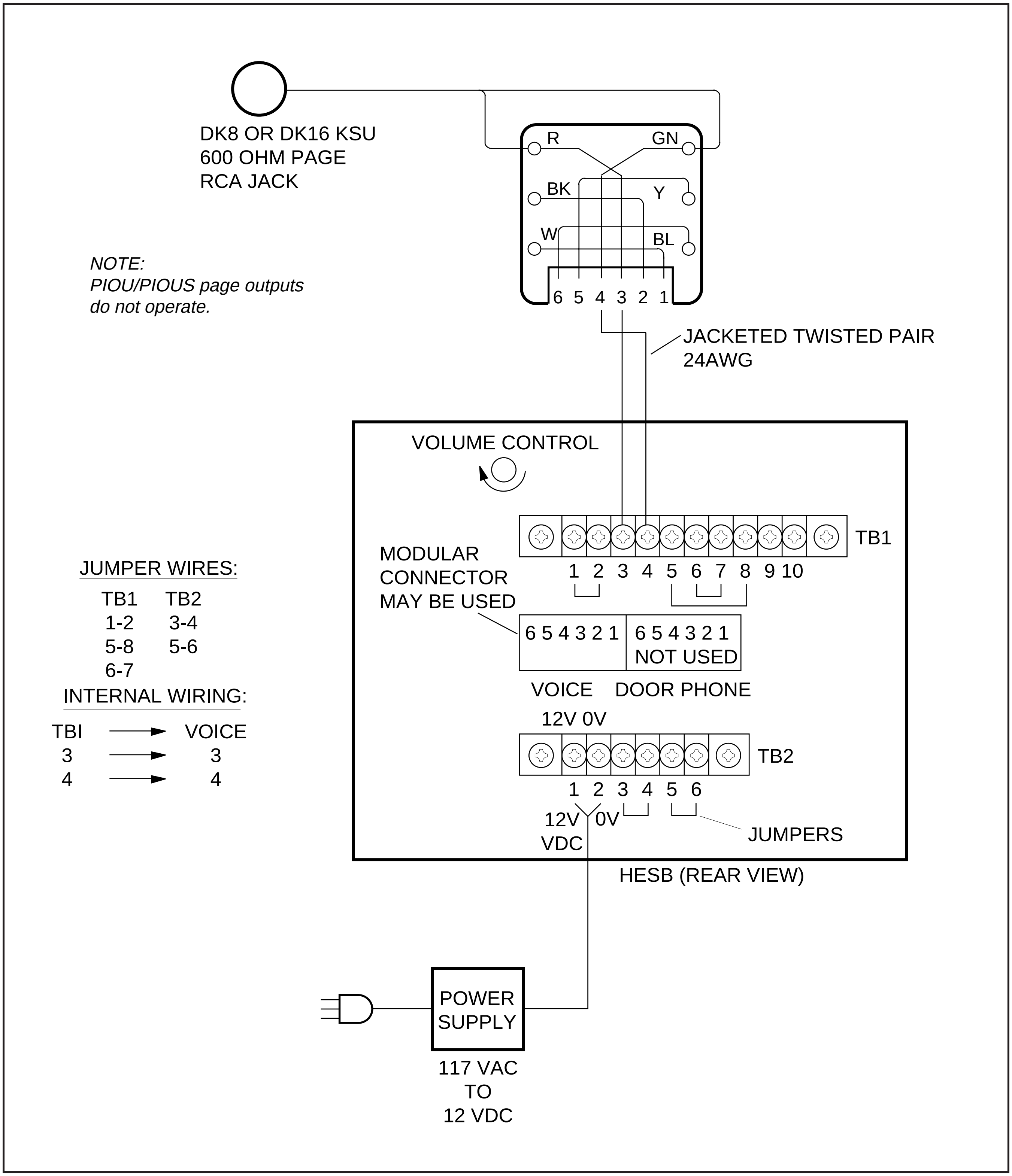


FIGURE 7-12
DK8 AND DK16 HESB/AMPLIFIED SPEAKER WIRING

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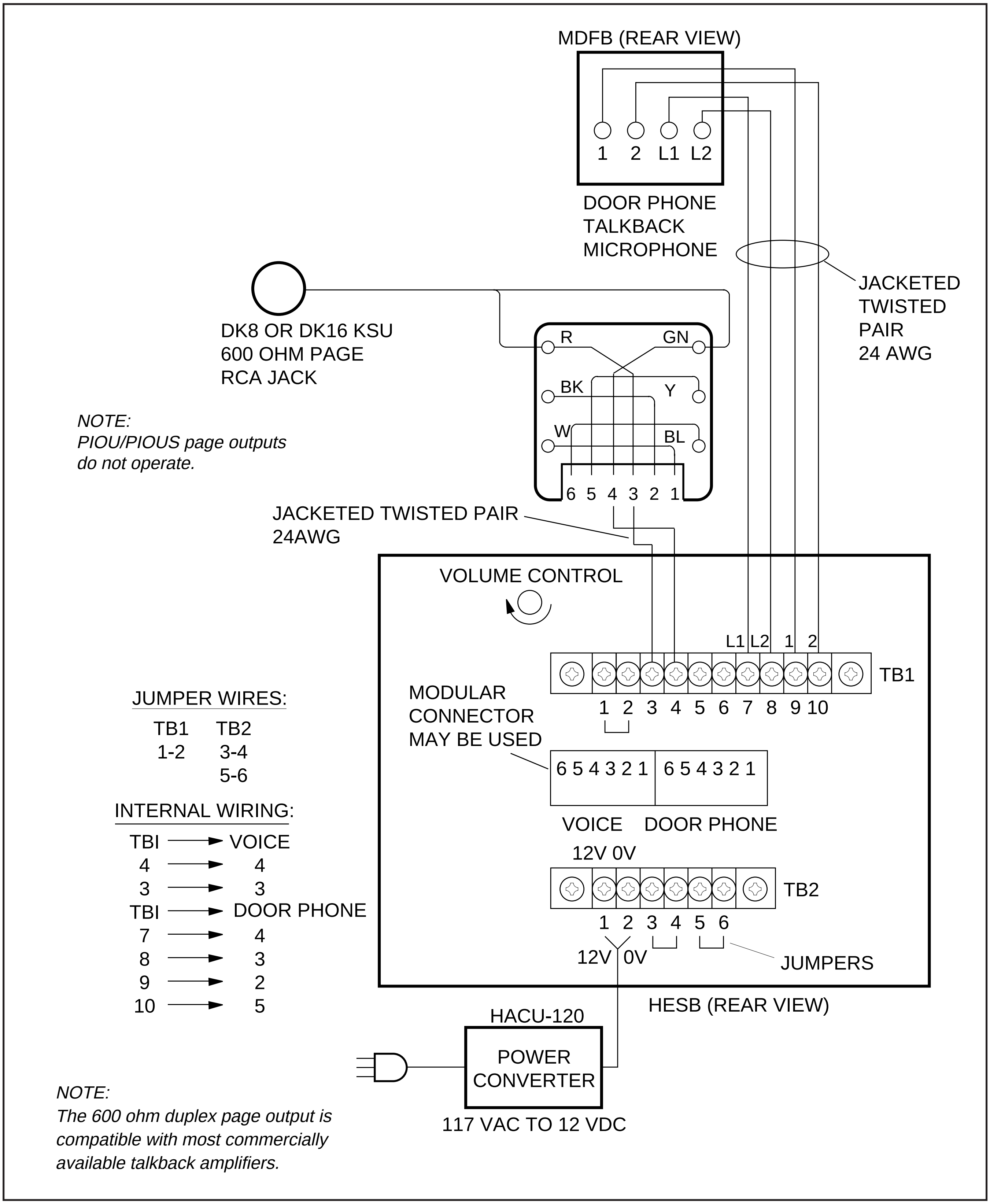


FIGURE 7-13
DK8 AND DK16 HESB/TALKBACK AMPLIFIED SPEAKER WIRING

2) Screw a 1.25-inch panhead wood screw into the mounting surface, use wall anchors if mounting to drywall surface.

3) Hang the HESB from the screw.

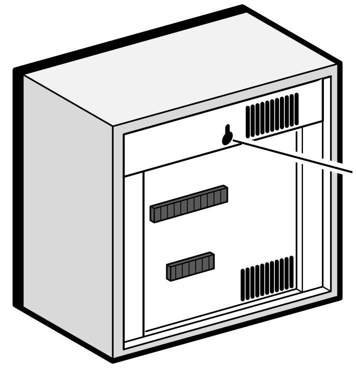


**FIGURE 7-14
HESB WALL MOUNTING**

5 EXTERNAL PAGE OPTIONS

5.00 System Hardware Requirements

5.01 The STRATA DK systems offer a variety of external page options. Additionally, a BGM option is available with each external page option. DK systems support:

- DK8 and DK16 Paging with BGM (same amplifier)
- DK16 Zone paging with BGM (separate amplifiers)
- DK16 Zone paging with BGM (multiple amplifiers)
- See Paragraph 2 of this section for more Page/ BGM options

5.10 External Page Option Installation

5.11 All voice paging connections are made via the 600 ohm Page RCA jack on the DK8 KSU or DK16 Base Unit. The PIOU and PIOUS voice and BGM (600 ohm and 3 watt) outputs are inoperable on the DK16 Expansion Unit.

5.12 DK8 and DK16 Page with Separate External BGM (same amplifier). In this configuration the MOH source or alternate BGM source provides BGM to digital/electronic telephones and a separate BGM source provides music to external speakers. Also, in this configuration Paging and external BGM are amplified by a common customer-supplied paging amplifier. When the external page access code is dialed, the external page control relay is activated, which applies a short to the amplifier mute control to mute the external BGM music. Install this option in accordance with the following steps (refer to Figure 7-15):

1) Connect the input no. 1 from the paging amplifier via an RJ11 jack to the 600 ohm RCA jack on the DK8 KSU or DK16 Base Unit.

2) Connect the paging amplifier mute terminal via a MDF to pins 42 and 17 of the 25-pair amphenol connector from the DK8 KSU or DK16 Base Unit.

3) Connect the music source to the input no. 2 of the paging amplifier.

4) Connect the speaker to the paging amplifier output.

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5.13 DK16 Zone Page with BGM (separate amplifiers). This configuration provides multiple-zone paging capability. The output of the paging amplifier is routed back to the PIOU, where it is switched to one of four sets of speakers by PIOU relays **K1** through **K4.** The relay selected is determined by the access code dialed by the station user. Default access codes are:

- K1/zone A = 35
- K2/zone B = 36
- K3/zone C = 37
- K4/zone D = 38
- All zones = 39

NOTE:
Multi-zone page output rating is 30W/maximum at 300 ohms.

5.14 An all zone page code (39) is also available as an option (see **Program 10-2**). When the all page code is dialed, all four relays are activated to permit simultaneous paging to all speaker zones and all digital and electronic telephone speakers. Install this option in accordance with the following steps (refer to Figure 7-16):

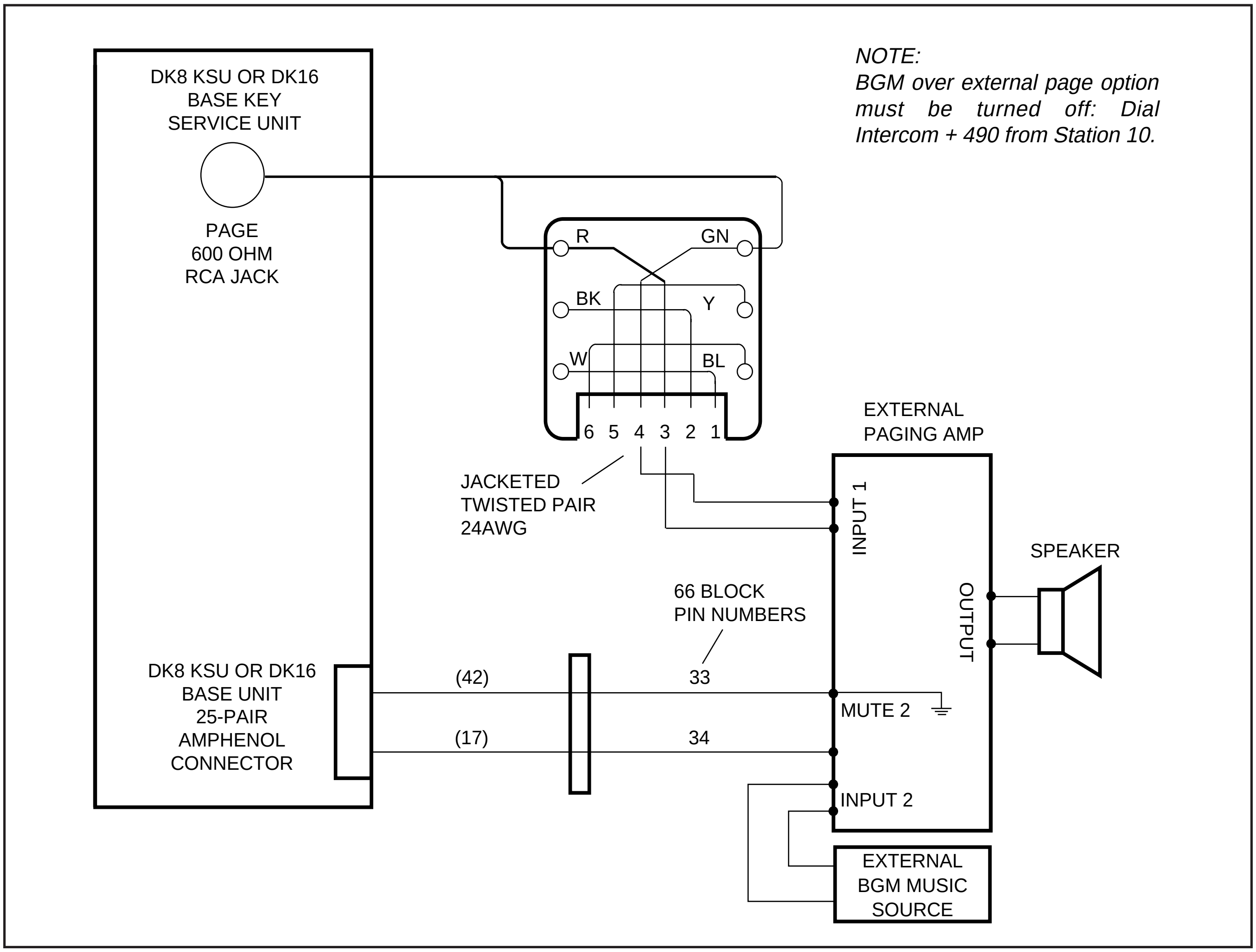


FIGURE 7-15
DK8 AND DK16 PAGE AND SEPARATE BGM USING SAME AMPLIFIER

1) Connect the input from the paging amplifier via an RJ11 jack to the J7 600 ohm RCA Jack on the Base Unit. Or, direct connect J7 to Amp using a standard audio cable with RCA plugs.

2) Connect the BGM music source to the music amplifier input.

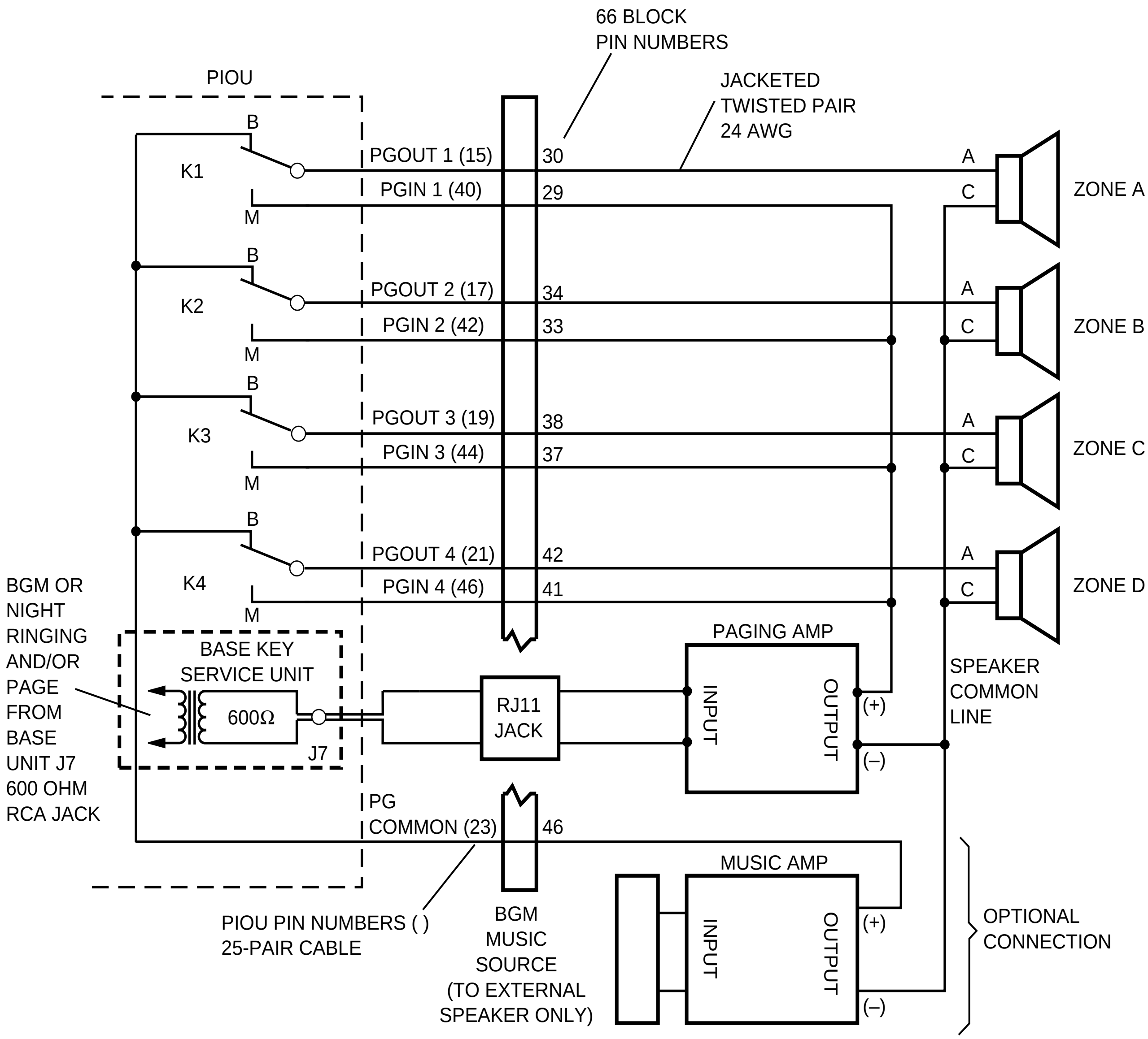
3) Connect the paging amplifier's (+) output to each PGIN of the PIOU **K1** ~ **K4** relays and the amplifier's (-) output to each of the zone A ~ zone D speakers (C).

4) Connect the BGM music amplifier (+) output to terminal 23 (PG COMMON) of the PIOU, and the (–) to the (–) output of the page amplifier.

5) Connect the PIOU PGOUT pins to the zone A ~ zone D speakers (A).

5.15 DK16 Zone Page with BGM (multiple amplifiers). This configuration also provides multiple-zone paging capability, as in Paragraph **5.13**. However, separate amplifiers are used for each zone. Install this option in accordance with the following steps (refer to Figure 7-17):

1) Connect the inputs from the paging amplifiers via an RJ11 jack to the J7 600 ohm Page RCA Jack on the Base unit. Or, direct connect J7 to Amp using a standard audio cable with RCA plugs.



NIGHT RINGING PROGRAM ASSIGNMENTS
(SEE PARAGRAPH **9** OF SECTION 100-816-207)

Program 77-1 Button/LED	Zone/ Relay	LED ON Assignment	LED OFF Assignment
13	K4	Tenant 2 COs	Tenant 1 COs
12	K3	Tenant 2 COs	Tenant 1 COs
11	K2	Tenant 2 COs	Tenant 1 COs
10	K1	Tenant 2 COs	Tenant 1 COs

FIGURE 7-16
DK16 PIOU ZONE, PAGE/BGM/NIGHT RING (SEPARATE AMPLIFIERS)

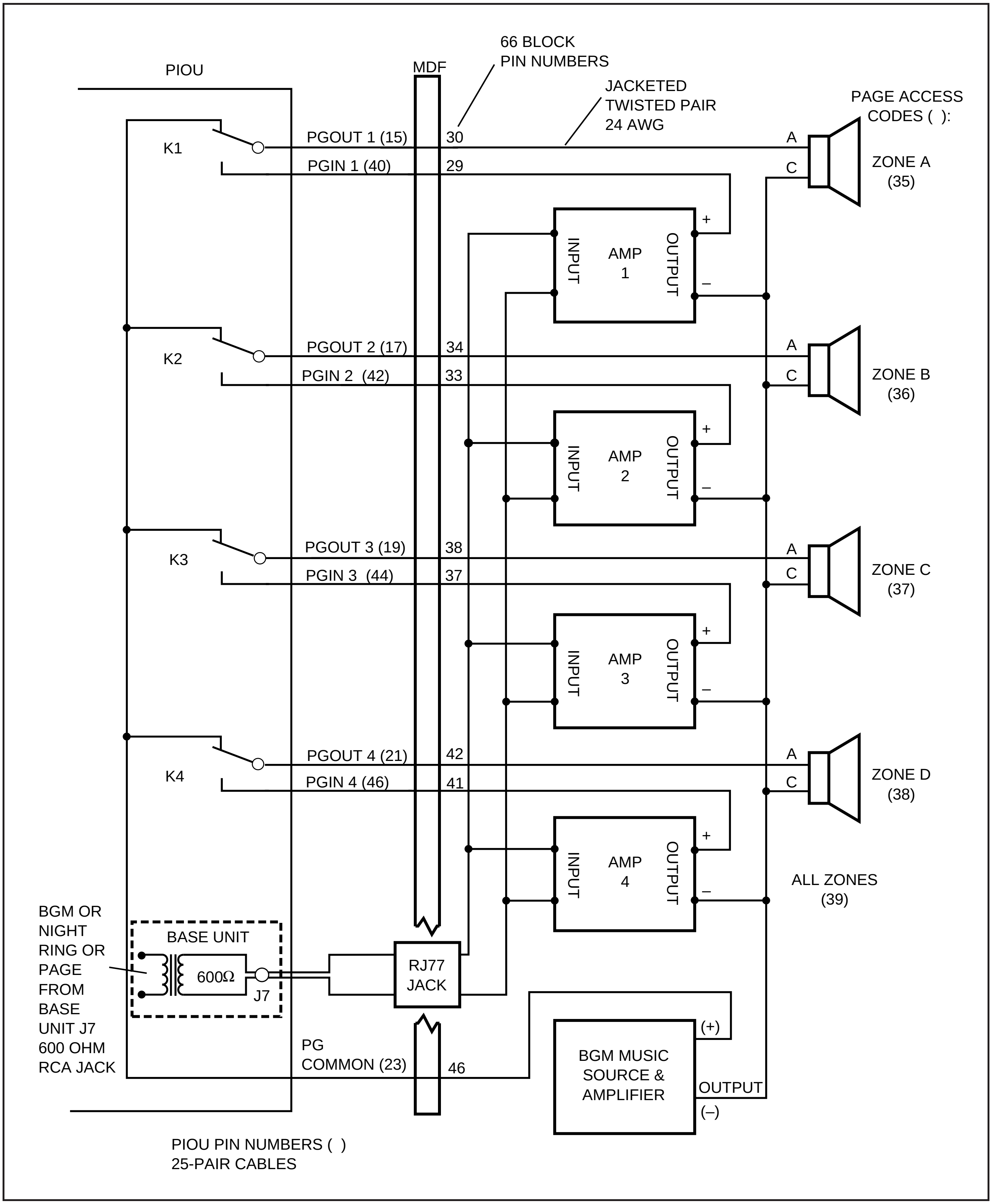


FIGURE 7-17
DK16 PAGING WITH MULTIPLE AMPLIFIERS

2) Connect the music source to the music amplifier input.

3) Connect the paging amplifier outputs to PIOU (PGIN) relays **K1** ~ **K4** and zone A ~ zone D speakers (C).

4) Connect the music amplifier (+) output to terminal 23 (PG COMMON) of the PIOU, and the (–) output to the “C” terminal of zone A ~ zone D speakers.

5) Connect zone A ~ zone D speakers “A” terminal to the “PGOUT” contact of the PIOU relays K1~ K4 respectively.

5.16 DK16 Night Ringing over All External Page Zones (PIOU only). To allow the night ringing signal to be sent over zone paging, install the paging amplifier in accordance with the following steps (refer to Figure 7-18). (Steps 2 ~ 6 are performed at the MDF.)

IMPORTANT NOTE: To night ring over selected PAGE zone, see Paragraph 9 of this section.

1) Connect the amplifier input via an RJ11 jack to the J7 600 ohm Page RCA jack on the Base unit. Or, direct connect J7 to Amp using a standard audio cable with RCA plugs.

2) Cross-connect the amplifier output A to the PGIN1 ~ PGIN4 connector from the PIOU.

3) Cross-connect the amplifier output B to the zone A ~ zone D speaker common line.

4) Cross-connect the PIOU PGOUT1 ~ PGOUT4 to zone A ~ zone D speakers (A).

5) Cross-connect the amplifier output A to pin 9 (NHR) of the PIOU.

6) Cross-connect a jumper from pin 34 (NHT) to pin 23 (PG COMMON) from the PIOU PCB.

7) In **Program 77-1**, set **LED 05 to OFF** and **06** to **ON.** Set **LED 08** to **ON** if door phones are to ring over external page when the system is in NIGHT mode.

8) In **Program 78,** enable the CO lines that are to ring via external page when the system is set in the NIGHT mode.

9) In **Program 39,** assign the **Night Transfer 1** or **Night Transfer 2** buttons to digital or electronic telephones per the System Record Sheets (see Note 2).

10) Press the **Night Transfer 1** or **Night Transfer 2** button on an electronic or digital telephone to set the system into the NIGHT mode. Test by calling into the system on a CO line assigned (**Program 78**) to night ring over external page.
    - When ringing sounds (see Note 2) over the page, press **Intercom 5 3 5** to answer.

NOTES:

1. *All zones will ring with this option; night ringing to selected zones is not possible; see paragraph 9 for night ring over selected page zones.*
2. *The* ***Night Transfer 1*** *or* ***Night Transfer 2*** *buttons put CO lines in NIGHT ring mode per* ***Program 15****; NT1-TENANT 1/ NT2-TENANT 2 CO line assignment.*

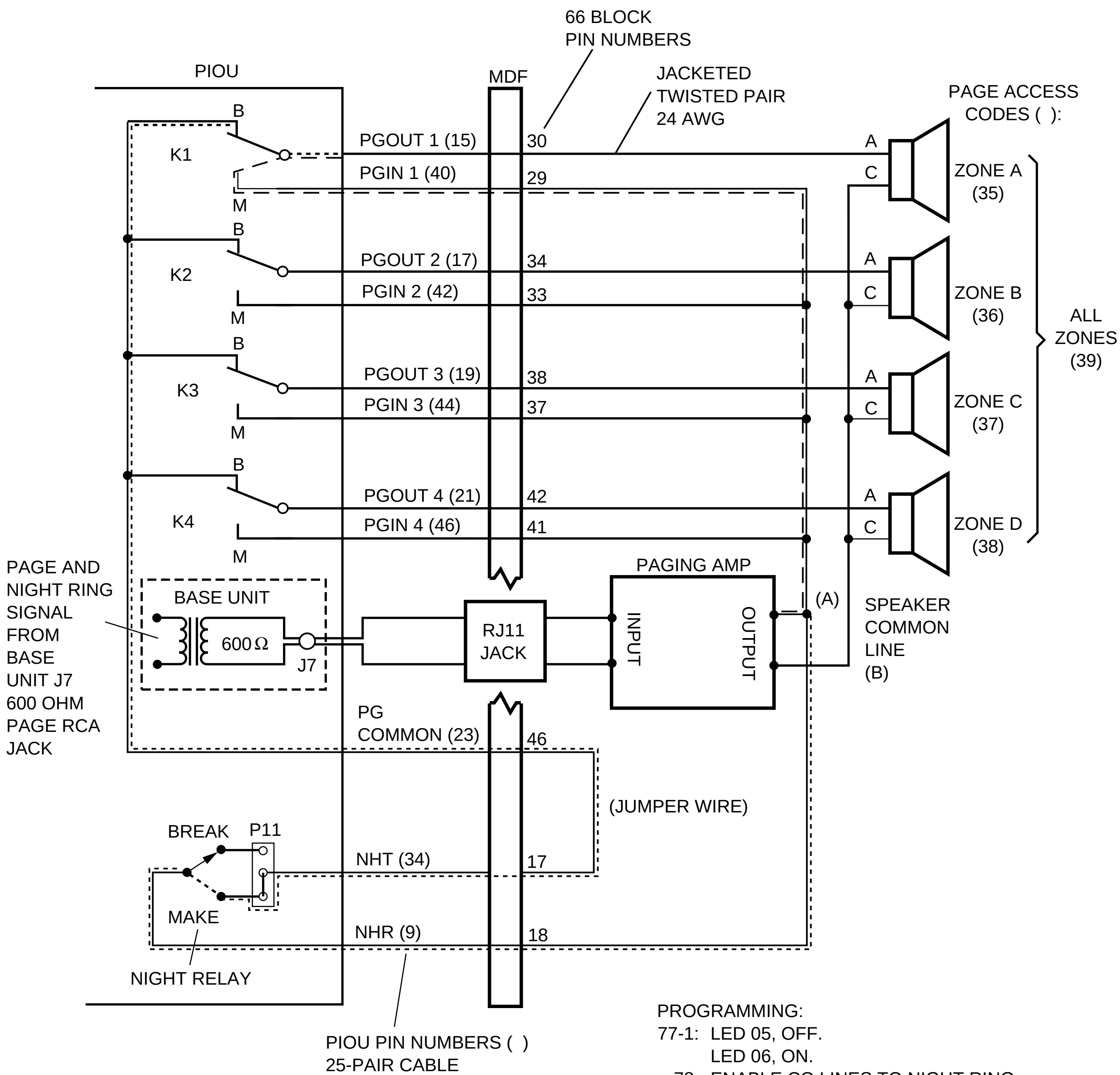
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6 DK8 AND DK16 STATION MESSAGE DETAIL RECORDING (SMDR) PRINTER/ CALL ACCOUNTING DEVICE OPTIONS

6.00 An SMDR printer or call accounting device may be connected to the system to provide a hard-copy record of station activity (incoming, outgoing, and transferred calls account code entries) on CO lines or a printout of the customer data base. Call record data is printed out at the completion of each call. Program SMDR with **Program 60**, and use **Program 97** to have the SMDR printer display the customer data base.

6.01 SMDR will send out special names for the following types of calls:

- **MSS:** Prints on DISA calls to stations (see Note).
- **MODM:** Prints on calls to the IMDU remote maintenance modem (station 619).
- **DISA:** Prints on DISA calls to CO lines when



PROGRAMMING:
77-1: LED 05, OFF.
LED 06, ON.
78: ENABLE CO LINES TO NIGHT RING OVER EXTERNAL PAGE.
77-1: LED 08, ON. FOR DOOR PHONE NIGHT RING OVER PAGE.

NOTES:
1. *Page signal path — — — — .*
2. *Night ring signal path - - - - - - - - - - .*
3. *Background music over zone page is not possible with this configuration.*
4. *Available with PIOU only: not PIOUS.*
5. *Night ringing will be sent to all zones; selected zones are not possible.*

FIGURE 7-18
DK16 NIGHT RINGING OVER ALL EXTERNAL PAGE ZONES

calling through the system CO-to-CO.

NOTE:
MSS will print only on DISA calls that are answered 10 seconds or 1 second (see Program 60-2) after the DK dial tone is sent to the calling party. If set for 10 seconds and the call is answered before 10 seconds, the call will register as a normal incoming call and the MSS/transfer portion of the call will not print out.

6.02 Figure 7-19 shows a sample SMDR printout and describes the contents of each column of the printout. The following examples show several call record samples and describe the sequence of events which occurred to generate the call records.

NOTE:
SMDR printout "time of day" and day/month/year (DD/MM/YY) is the same as the system clock time/date. SMDR DD/MM/YY will print out each time 50 call records are generated.

SMDR PRINTOUT EXAMPLES

Direct Inward System Access (DISA) CO Lines

NOTE:
DISA station calls print out as MSS.

EXAMPLE 1—Ring, No Answer DISA Call

Call Sequence A
- Outside caller rings CO line 03 (CO line 03 is programmed as a DISA line).
- Line 03 returns intercom dial tone to caller after two ring cycles (5 ~ 6 seconds).
- Caller does nothing.
- After 32 seconds, call is disconnected.
- Printout **A** prints after disconnect at 4:59.

PRINTOUT A
```
03 MSS 04:59 00:00:32 00:06
```

EXAMPLE 2—DISA Internal Station Call

Call Sequence B
- Outside caller rings CO line 03 (CO line 03 is programmed as a DISA line).
- Line 03 returns intercom dial tone to caller after two ring cycles (5 ~ 6 seconds).
- Caller dials 13.
- After 48 seconds from start of call, station 13 answers.
- Printout **B** prints after station 13 answers the call at 4:32.

NOTE:
*If **Program 60-2** is set for 10 seconds, MSS will not print if the call is answered within 10 seconds from when the caller receives dial tone.*

PRINTOUT B
```
03 MSS 04:32 00:00:48 00:05 13
```

EXAMPLE 3—DISA Outgoing CO Line Call

NOTE:
DISA CO line calls print out as DISA.

Call Sequence C
- Outside caller rings CO line 01 (line 01 is programmed as DISA).
- Line 01 returns intercom dial tone after two ring cycles (5 ~ 6 seconds).
- Caller dials 703 to access CO line 03 (outgoing).
- Caller dials the DISA security code and receives CO dial tone.
- Caller dials the telephone number and converses when the call is answered.
- Caller hangs up.
- The call releases, and Printout **C** prints after the call disconnects at 12:22.

NOTES:
1. *If the CO provides the auto release (AR) signal (see **Program 15**), the call disconnects when either party hangs up. A "*" will print out following the CO line number if the call is disconnected by the AR signal.*
2. *If the auto release signal is not returned, the CO lines will remain seized until the DISA disconnect timer releases the call (approximately five minutes).*

PRINTOUT C

Auto Release Signal:
```
03*DISA 12:22 00:02;01 (outgoing)
01 DISA 12:22 00:02;01 (incoming)
```

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```
07/06/90 <DD/MM/YY, EVERY FIFTY CALL RECORDS AND AT MIDNIGHT>
01   15 08:14 00:00;22                            123456987          456789
01 MODM 08:15 00:00;18 00;00 <DISA CALL TO IMDU>
03   10 08:16 00:00;28 00;08 12
03 DISA 08:16 00:00;15 <OUTGOING DISA ACCESS BY INCOMING DISA 01>
01 DISA 08:17 00:00;25 <INCOMING DISA AND ACCESS CO 03 OUTGOING>
03  MSS 08:18 00:00;12 00;06 15  <05 ANSWERS DISA CALL 12 SECONDS AFTER DK DIAL TONE>
03   15 08:19 00:00;22          12
03*6 12 08:19 00:00;16             First Digit (varies)       Last (always this column)
04   10 08:20 00:00;34             12345678912345678965412365
02   10 08:22 00:00;22                             7145833700 First Digit (varies)  Last
01   15 08:23 00:00;40                             7145833700 123456789456321
```

Field Column (FC: 1-2)[3] — CO Line Number (01~36)

(FC: 4-7)[3] — Station Number (1~4 digits; see Note 2)

(FC: 9-13)[3] — Time of Day (HH:MM; hour and minute the call was released)

(FC: 15-22)[3] — Call Duration (HH:MM:SS, see Note 1)

(FC: 24-28)[3] — CO Line Incoming Ring Duration Before Answer (MM:SS)

(FC: 30-33)[3] — Station to which the CO Line was transferred (1~4 digits)

(FC: 35-60)[3] — Outgoing Telephone Number (1~26 digits)

(FC: 62-76)[3] — Account Code (4~15 digits)

NOTES:

1. *Call Duration (incoming, outgoing, or transfer) can be 1.0 or 10 seconds (minimum) to generate a call record printout (see **Program 60-2**).*
2. *"MSS": designates a Direct Inward System Access (DISA) CO call to a station that is not answered; or, answered after 1.0 or 10 seconds (depending on **Program 60-2**). DISA calls always register 05 ~ 06 seconds ring before answer duration time.*
   "MODM": designates a call to the IMDU, Remote Maintenance Modem.
   "DISA": designates a DISA call thru the system via CO to CO connection.

*3. *Field column information is provided for SMDR output formatting purposes.*

4. *The call record data is ASCII-formatted, 8 bits; no parity, 1-stop bit.*
5. *Special dial printout:*
   Tone = "T"
   Long pause = "L"
   Flash = "F"
   Pause = "P"
6. *The "*" indicates that the call was disconnected by the Central Office Calling Party Control (CPC) or Automatic Release (AR) signal. CO lines must have Programs 15-0 and 15-3 enabled to be dropped by the CPC signal.*

FIGURE 7-19
DK8 AND DK16 SMDR PRINTOUT EXAMPLES

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Disconnect Timer:

```
01 DISA 12:24 00:04;57 (incoming)
03 DISA 12:24 00:04;57 (outgoing)
```

6.03 System Program Data Printout. If a printer is connected to the SMDR port on the QSMU, PIOU, or PIOUS, customer program information stored in the system RAM may be printed out for reference by using **Program 97** (see Paragraph **6.14**).

6.10 SMDR Hardware Requirements

6.11 The DK8 system must be equipped with a QSMU option PCB. QSMU **Program 10-3, LED 04** must be **OFF**. Install the QSMU PCB in accordance with Section **100-816-204** and wire the SMDR device to the QSMU (PPTC/mocular cord) in accordance with Section **100-816-208**. The DK16 system must be equipped with a PIOU or PIOUS PCB in the Expansion Unit to support the SMDR printer/call accounting device option. Connection of the printer or call accounting device to the PIOU or PIOUS PCB is accomplished with a 3-pair modular cord (7 feet maximum) and a PPTC connector adaptor (refer to Figure 7-20 for details). Call record data is ASCII-formatted, 8 bits, no parity, 1-stop bit.

6.12 The DK8 KSU and DK16 PIOU or PIOUS contains a call record buffer which stores call record data (for 20 calls on DK8 or 50 calls on DK16) when the printed or call accounting device is turned off, or when no device is connected to the SMDR port. No further call records are stored after the buffer is filled. When the printer or call accounting device is made operational, an "ERROR BUFFER OVERFLOW" message is printed to indicate that the buffer was full, and that some call information may have been lost.

6.13 SMDR Programming Considerations

6.14 Selectable programming options for the SMDR printer or call accounting device are:

Program 60

- Item 2—Determines the length of time a call must be active before it will be registered by SMDR.
- Item 3—Selects the records of outgoing calls or outgoing and incoming calls to be printed.
- Item 4—Selects digit length of account code (4 to 15 digits).
- Item 5—Allows only long distance call records to be printed.

Program 97

- Allows system program data to be printed via the SMDR port (refer to Figure 7-21 for an example printout).

NOTES:

1. *An SMDR printer must be connected to the SMDR port to use the printout option selected by **Program 97**.*
2. *Call record data is lost when program data is printed out using **Program 97**.*

6.20 SMDR Printer/Call Accounting Device Installation

6.21 Install the SMDR printer/call accounting device option in accordance with the following steps (refer to Figures 7-20, 8-26, and 8-24):

1) Connect the interface cable and the PPTC adaptor from the DK8 QSMU or DK16 PIOU or PIOUS SMDR port to the SMDR printer or call accounting device DB25 connector.

2) Set the DK16 PIOU or PIOUS **SW1** switch to the appropriate baud rate (300 or 1200 bps), as determined by the baud rate of the printer or call accounting device. For DK8, QSMU is always 1200 bps.

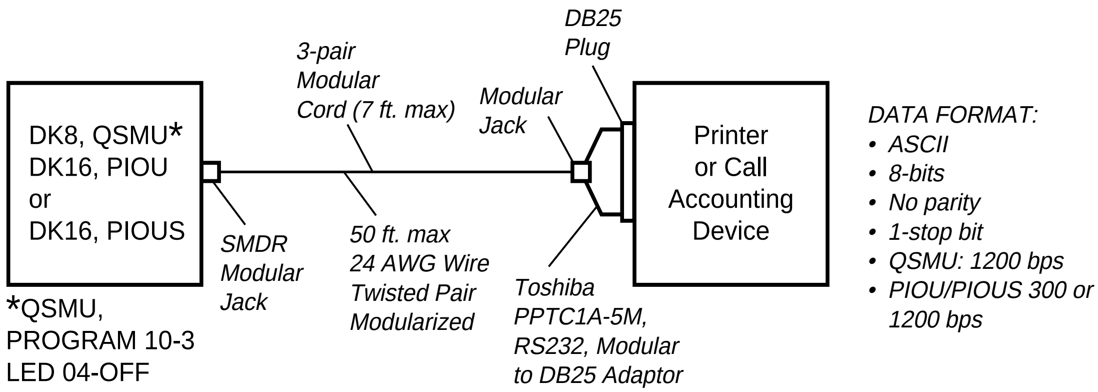
3) The DK8 QSMU **Program 10-3, LED 04** must be **OFF** for SMDR operation.

4) Set the printer or call accounting device to 8-bits/no parity/one stop bit.

5) Program (**Program 60**) the system for the required SMDR printer/call accounting device options (refer to Paragraph **6.13** and the Programming Procedures, Section **100-816-300**).

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BASIC CONNECTION



BASIC WIRING (see: QSMU PIOU or PIOUS TTY and SMDR Wiring in Chapter 8 for more detail)

PIOU, SMDR Jack Modular Pin No.	PPTC1A-5M Adaptor		RS-232 Lead Name
	Modular Pin No.	DB25 Pin No.	
1 To →	6 To →	3	RD
2 To →	5 To →	2	TD
3 To →	4 To →	6	DSR
4 To →	3 To →	20	DTR
5 To →	2 To →	8	CD
6 To →	1 To →	7	SG
		4 Jumper to 5	RTS to CTS

FIGURE 7-20
DK8 AND DK16 PIOU/PIOUS SMDR CABLE CONNECTIONS

7 VOICE MAIL OPTIONS

7.00 System Hardware Requirements

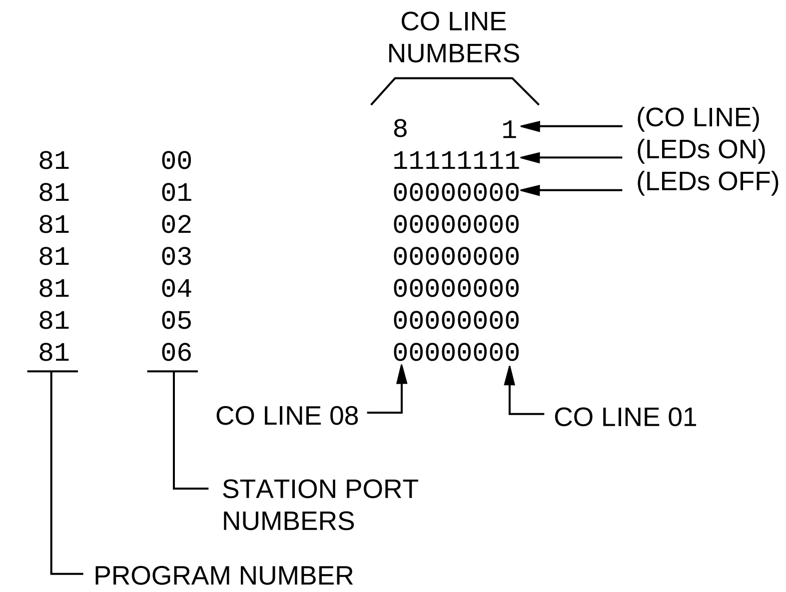
7.01 The STRATA DK8 and DK16 may be configured to support Toshiba VP voice mail messaging system or a customer-supplier voice mail system.

7.02 The DK8 must be equipped with a QSTU, and the DK16 must be equipped with a KSTU, PSTU, or PESU to support a voice mail system. The DK8 QSTU is equipped with two standard telephone circuits; the DK16 KSTU is equipped with four standard telephone circuits, the PSTU with eight, and the PESU with two. A K4RCU subassembly must be installed in the DK16 Base Unit, and a QRCU must be installed in the DK8 KSU. The voice mail system can be connected to any standard telephone circuit at the MDF block.

7.10 Toshiba VP Voice Messaging System

7.11 The STRATA DK8 and DK16 is designed to support the full range of features offered by the Toshiba VP provides various call routing, message handling, and information management features, including:

- Automated Attendant
- Call Forward to Voice Mailbox
- Message Waiting Indication



NOTES:
1. In this example all lines are programmed to immediately ring the station at port 00 only.
2. 0 = LED off, 1 = LED on.

FIGURE 7-21
PIOU/PIOUS SMDR PORT (PROGRAM 97) DATA DUMP EXAMPLE

- Voice Mail Control from digital and electronic telephone
- System Monitoring
- Feature Integration

7.12 A block diagram of voice mail connections is shown in Figure 7-22. See Section **100-816-204** for QSTU and Section **100-816-205** for PSTU, KSTU, and PESU installation instructions.

7.13 STRATA DK8 and DK16/VP Programming Considerations. Some features of STRATA DK8 and DK16 system programming are intended for Toshiba VP, and are not necessarily available for customer-supplied voice mail messaging systems. These programming features are:

- **Answer (A) Tone.** The STRATA DK8 and DK16 stations will send an answer tone to Toshiba VP when the station answers a Toshiba VP call.
- **Disconnect (D) Tone.** The STRATA DK8 and DK16 stations will send a disconnect tone to Toshiba VP when the station hangs up while connected to Toshiba VP. (D-Tone is also sent to release the Toshiba VP auto attendant port when an outside CO line caller hangs-up and the Central Office provides a disconnect signal, per **Program 15-0** and **15-3**.)

NOTE:

1. *Not all Central Offices provide the disconnect signal (calling party control) so this feature will not operate in all areas.*
2. *Both answer and disconnect tones provide more efficient Toshiba VP port use. Always enable these options. Both options are enabled by accessing **Program 31** and setting LED 15 to **ON** (LEDs 16 and 17 must also be ON to allow A and D tones), and by accessing **Program 15-0** and **15-3** and enabling CO lines with ARVM and AROH calls.*
3. *The AR signal of some Central Offices is not reliable and may occur at times during a CO line voice connection causing the call to disconnect during a conversation. If this occurs, **disable** AROH and ARVM calls on all CO lines (**Program 15-0** and **15-3**).*

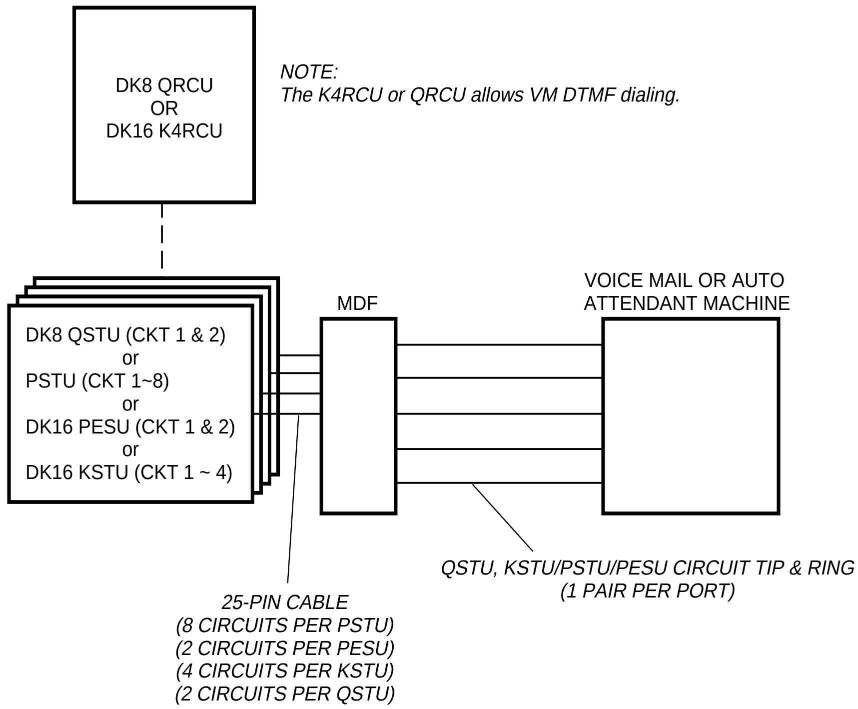


FIGURE 7-22
DK8 AND DK16 VOICE MAIL/AUTO ATTENDANT BLOCK DIAGRAM

- **B Tone Signals.** Stations send a recall (B) tone to VP whenever Toshiba VP answers a transfer (camp-on) recall from a station that did not answer a Toshiba VP blind transfer. (The B tone notifies Toshiba VP that the call is a recall and not a new call, allowing Toshiba VP to respond with the appropriate greeting.) For this feature to operate, the QSTU, PSTU, KSTU, or PESU voice mail ports must have LEDs 19 and 20 turned **ON** in **Program 31**.

7.14 Toshiba VP Installation. Use the preceding information in concert with Paragraphs **7.23** and **7.24** to install Toshiba VP.

7.20 Customer-supplied Voice Mail Messaging Systems

7.21 STRATA DK8 and DK16 systems are designed to support a wide range of customer-supplied voice mail messaging systems. Depending on the voice mail system used, some of the features available with Toshiba VP (refer to Paragraph **7.10**) may be available with the customer-supplied system.

7.22 DK8 and DK16 Voice Mail (QSTU, PSTU, KSTU, or PESU Port) Programming Considerations

7.23 Voice mail (all types) QSTU, KSTU, PSTU, or PESU port programming is accomplished using **Programs 31** and **10-2** (refer to Programming Procedures, Section **100-816-300**, for details). Voice mail (VM) programming features are:

- **VM Groups**—This feature groups VM QSTU, KSTU, PSTU or PESU ports together so that message waiting set/cancel signals appear to originate from the lowest port in the VM group. All VM ports connected to a particular VM machine should be set in the *same* VM group (**Program 31**, LEDs 05 ~ 08).
- **Message Waiting Set/Cancel**—If the VM machine has the ability to dial a code, plus the appropriate station numbers to set or cancel the message waiting LEDs on electronic telephones,

program the VM machine to dial the following sequences (In **Program 10-2**, turn LED 04 ON):

1) To set a MW LED, the VM machine must dial **6 3** + station number.

2) To cancel a MW LED, the VM machine must dial **6 4** + station number.

NOTE:
Only dial codes 63 and 64 are set in the VM device configuration; the VM device will dial the station number automatically to set/cancel the Message Waiting indication LED.

- **No Conference VM**—Prevents undesired CO line three-party connections during VM call transfers. All VM ports should be set for no conference (**Program 31**, LED 09).
- **Privacy Override Deny**—Prevents stations from overriding (breaking in) in-progress VM calls (**Program 31**, LED 18).
- **End-to-End Signaling**—Allows VM port DTMF operation. All VM ports should be set for end-to-end signaling (**Program 31,** LED 17).

NOTE:
The DK8 QRCU or DK16 K4RCU must be installed to allow End-to-End Signaling.

- **VM to VM Call Blocking**—Prevents VM auto attendant calls from forwarding back to VM auto attendant during supervised transfers (**Program 31**, LED 04 ON). This will prevent the problem of auto attendant to auto attendant looping connections.
- **Receive Auto Call Forward ID Codes**—Provides auto digits from call forwarded stations to direct callers to stations' mailboxes. All VM ports should be set to receive auto ID code (**Program 31**, LED 16).
- "A" and "D" tones; see Paragraph **7.13**.

7.24 Voice Mail Program Checklist. The following items should be verified before programming voice mail:

1) Set Toshiba VP Maintenance Menu system parameters to "D" = STRATA DK8 and DK16 (see Toshiba VP *Installation and Maintenance Manual* for other parameter settings).

2) STRATA DK8 and DK16 programs:
- **Program 92**: Initialization clears voice mail auto dial codes.
- **Program 03**: Verify that the KRCU is programmed in the Base Unit to allow the VM/AA to send DTMF tones (does not apply to DK8).
- **Program 04**: Assigns station numbers to VM/AA ports (initialized numbers recommended).
- **Program 05**: First digit of special codes 63 and 64 (initialized numbers recommended).
- **Program 10-1**: Set the system for voice first, and program the VM/AA device to dial the suffix as "1" after station numbers.
- **Program 10-2**: Set LED 04 ON for set/cancel operation and 06 ON for the VM to detect 80 msec. tones.
- **Program 13**: If the VM/AA device is the message center, set the lowest VM port as the message center.
- **Program 31**: Turn LEDs 05, 09, and 15 ~ 20 ON for the QSTU, KSTU, PESU, or PSTU ports that are connected to the Toshiba VP VM/AA ports. Do not set these options for standard telephone, digital telephone, or electronic telephone station ports. LED 04 should be off if the auto attendant only "BLIND" transfers; if the AA does "Supervise" or "Screened" transfers, set LED 04 ON for auto attendant ports.

NOTE:
A, D, and B tones should be enabled only for VM/AA devices that respond to these tones.

- **Program 33**: Set the QSTU, KSTU, PESU and PSTU ports that are connected to the VM/AA ports to a hunting sequence, starting with the lowest port hunting to the next highest port, etc. The last hunt should be to an attendant.
- **Program 35**: LEDs 01 and 02 must be ON for stations to receive the message indication (Msg LED flashing) from a VM device.

- **Program 35**: LED 20 should be ON to assign auto attendant ports the "Busy Station Transfer" option. with this option the auto attendant will receive ring backtone when calling stations designated with "Busy Station Ringing" (Program 35, LED 19 ON). This allows the auto attendant to transfer calls to busy stations. Set LED 19 ON for answer position stations.
- **Program 36**: Set fixed call forward to VM/AA port per customer requirements.
- **Program 37**: Set the timer for the VM/AA ports to 22 seconds minimum to allow call forward no answer to work on VM transferred calls.
- **Program 39**: Set the Message Waiting Indication, Fixed Call Forward, Redial, and Speed Dial Select buttons on the digital and electronic telephones that will be used to communicate with the VM/AA device.

NOTE:
***Message Waiting** (Msg) and **Redial** buttons are fixed buttons on digital telephones and it is not necessary to assign them in **Program 39**. **Speed Dial** is initialized as Button 20 on Digital telephones.*

- **Programs 81 ~ 89**: Verify that the ringing assignments to the VM/AA devices are set per customer requirements.
- **Programs 16, 40, 41, 45 ~ 48 and 50 ~ 56**: Verify that outgoing CO line access is allowed on VM ports to allow the VM/AA beeper notification feature to operate.

7.25 Voice Mail System Installation. Install the voice mail messaging system in accordance with the following steps (See Figure 7-22):

1) Ensure that the QSTU, KSTU, PSTU, or PESU PCB is installed in the system per Section **100-816-204** (DK8) or Section **100-816-205** (DK16).

2) Connect the voice mail messaging system to the selected QSTU, KSTU, PSTU, or PESU standard telephone ports (refer to Wiring Diagrams, Section **100-816-208**, for QSTU, PSTU, KSTU, and PESU wiring/interconnecting details).

3) Program the system for the required voice mail messaging features (refer to Paragraphs **7.13** and **7.22**).

4) Ensure that the DK8 QRCU or DK16 K4RCU is installed, and (for DK16) verify that the CTU code in Program 03 is for KRCU-4 operation as required (this is not required for DK8 QRCU).

5) Perform additional voice mail messaging system programming as applicable (refer to customer-supplied installation/programming manuals).

NOTE:
Some voice mail devices may ring trip when called; in this case, set the ring voltage jumper to L (low position) on the QSTU, KSTU, PESU, or PSTU2 PCB connected to the voice mail device.

8 DK16 ALARM SENSOR INSTALLATION

8.00 The PIOU or PIOUS PCB provides a circuit that can be set to detect a relay open or closed condition from a facility alarm system. When the sensor is activated, all electronic and digital telephones will sound an alarm signal. The electronic/digital telephone alarm signal can be reset by any electronic or digital telephone with an alarm reset button (see Program 39).

8.01 Alarm Sensor Options. Jumper plug P12 on the PIOU is used to set the alarm sensor to detect an open or closed condition from the facility alarm system. Set P12 as follows (refer to Figure 7-23):

- To detect a closed condition, set P12 to the N.O. position.
- To detect an open condition, set P12 to the N.C. position.

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8.02 Jumper W3 on the PIOUS is used to set the alarm sensor to detect an open or closed condition from the facility alarm system. Solder the W3 jumper wire as follows (refer to Figure 7-23):

- To detect a closed condition, solder W3 to the normal open position.
- To detect an open condition, solder W3 to the normal closed position.

8.03 Alarm Sensor Wiring. Refer to Figure 7-23, and connect the facility alarm system relay contacts to the PIOU/PIOUS PCB.

9 DK16 NIGHT RINGING OVER EXTERNAL ZONE PAGE

9.00 In systems shared by two tenants, each tenant's CO lines can be assigned to night ring separate PIOU external page zones (Figure 7-16). This feature can also be used in one-tenant systems.

9.01 With shared systems, for example, tenant 1's night ringing CO lines could be programmed to ring PIOU external page zones 1 and 2, while tenant 2's lines could be programmed to ring zones 3 and 4. In non-shared systems, night ringing CO lines can be assigned to ring all of the zones or just selected zones.

9.02 The following programs must be used to assign CO lines to ring selected PIOU page zones:

- **Program 78-1**: Assigns CO lines, tenant 1 and tenant 2, that will night ring over PIOU external page zones.
- **Program 15-5**: Assigns CO lines to tenant 1 or tenant 2. Lines are initialized as tenant 1.
- **Program 77-1 (LEDs 10 ~ 13)**: Assigns tenant 1 and tenant 2 CO lines to night ring specific PIOU external page zones. LED 06 must also be ON in **Program 77-1**.
- **Program 39**: Assigns appropriate **Night Transfer**, or **Night Transfer 1** (tenant 1), and **NT2** (tenant 2) buttons to electronic and digital telephones.

NOTES:

1. *See Paragraph **5** and Figure 7-16 and 7-17 for PIOU zone paging installation instructions.*
2. *Any station can pick up CO lines that night ring over external page zones by dialing **Intercom 5 9.***

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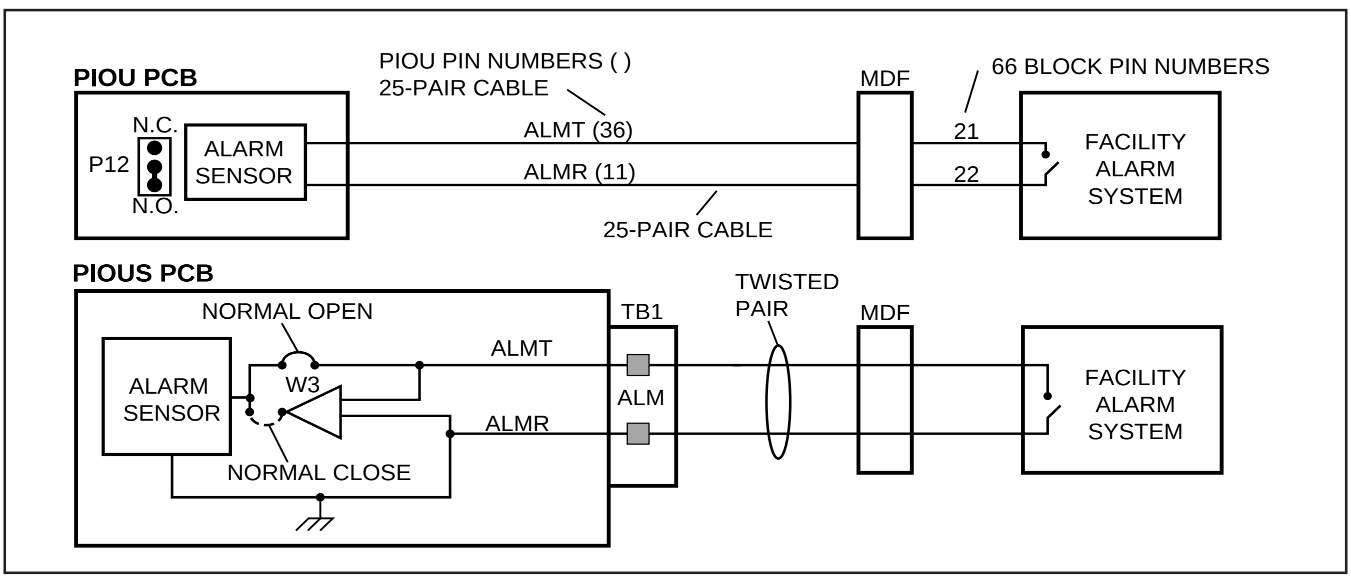


FIGURE 7-23
DK16 ALARM SENSOR BLOCK DIAGRAM (PIOU/PIOUS)

10 DATA INTERFACE UNIT INSTALLATION

10.00 General

10.01 STRATA DK8 and DK16 support two types of Data Interface Units (DIUs) that enable digital telephone users to simultaneously transmit and receive data on the same digital station port and wire pair while communicating on a voice call. One unit, called the integrated DIU (PDIU-DI/PDIU-DI2), becomes part of the digital telephone, replacing the telephone's base; the other unit, is a small self-contained unit called the stand-alone DIU (PDIU-DS). Each DIU is powered by the digital port it is connected (see Table 8-D for wiring requirements).

NOTES:
1. *"Digital Ports" includes the DK8 KSU, DK16 Base Unit, PDKU and KCDU digital station ports. This applies wherever the term "Digital Ports" is used in the text and figures in this chapter.*
2. *2000-series digital telephones require PDIU-DI2 and 1000-series telephones require PDIU-DI.*

10.02 Both DIUs can be connected to standard Electronic Industries Association (EIA) RS-232 asynchronous serial data devices. EIA devices are divided into two categories: data communication equipment (DCE) and data terminal equipment (DTE). Common DCE devices are modems and some printers; common DTE devices are personal computers, ASCII terminals, and some printers. The PDIU-DI operates like a DCE and connects directly to DTE devices using standard RS-232 cables. Depending on how its internal jumper plugs are configured, the PDIU-DS can either operate like a DTE and connect to DCE devices; or operate like a DCE device and connect to a DTE device. In most applications, DTE and DCE devices exchange data between each other via the standard RS-232 cable connection.

10.03 DIUs can function with DCE and DTE devices at data speeds of up to 19.2 kbps. However, keyboard dialing using AT commands (from a PC or terminal connected to a DIU) is limited to 9600 bps. A speed of 19.2 kbps can be achieved when dialing from a PDIU-DI-equipped digital telephone dialpad, but many PC software programs do not yet handle 19.2 kbps in an error-free manner. Also for a 19.2 Kbps operation the computer or terminal's "COM" port must be specified to function at 19.2 Kbps. Some computer "COM" ports, like those used in older IBM XT type computers, will not operate at 19.2 without errors. DIU data transmission speed is set by the first AT command that the DIU receives once it is in the command state; if manual dialing or receiving calls in the auto answer (default) mode, the transmission speed is transparent.

IMPORTANT NOTE!
To use the PDIU-DI or PDIU-DS with AT commands, communications software or a PC program that performs terminal emulation must be used. AT commands cannot be issued from the computer's operating system prompt.

10.10 Common DIU Connections

10.11 The block diagram in Figure 7-24 illustrates common DIU connections. In this example, PDIU-DIs are connected to personal computers (PC1 and PC2), and PDIU-DSs are connected to a serial printer and modems. The personal computer users can transfer files internally, print files on the same printer, and access the modem pool to send/receive data to/from an external personal computer or dial up data service.

10.12 To access these devices, a data call connection must be established between the DIUs. This is accomplished by dialing the destination DIU from a digital telephone dialpad or from a PC keyboard using standard AT dial commands. PDIU-DIs share the same intercom numbers/ports with the digital telephone to which they are connected, while PDIU-DSs have their own. The Intercom and Data Call LEDs on the digital telephone tell the system whether a voice or data call is being made: the Intercom LED, voice calls; and the Data Call LED initiates data calls. When dialing from a keyboard with AT commands, **A T D** is typed for voice calls, and **A T D D** for data calls.

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10.13 Installation instructions for these devices are provided in Paragraphs **10.40** thru **10.70**. Call paths and scenarios for five types of data test calls are provided in Paragraphs **10.82** ~ **10.86**. Step-by-step data calling procedures are provided in the *Data Interface User Guide* in the *Installation & Maintenance Manual*, *Operating Procedures.*

10.20 EIA Interface Leads (Signals)

10.21 Both DIUs operate with nine standard EIA RS-232 interface leads (signals) on which signaling data is transmitted and received. DIUs connect to serial data devices with standard RS-232 cables, available from telephone supply stores (see Figures 7-25 ~ 7-30). The PDIU-DI/PDIU-DS requires nine signals for some applications, but can function with eight using modular cords and connectors with RJ45/DB25 adapters for other applications. If uncertain which signals are necessary for an application, all nine should be connected.

IMPORTANT NOTES!

1. ***The PDIU-DI is always a DCE device; the PDIU-DS may be a DTE or DCE, depending on how its internal jumpers (1 ~ 9) are configured.***
2. ***In the descriptions below, when a signal is ON, its potential is about seven volts positive relative to signal ground (pin 7); when a signal is OFF, it is about 7 volts negative relative to the signal ground (pin 7).***

- **Frame Ground (FG, Pin 1):** The FG signal (EIA circuit AA) is a protective or safety ground which is bonded to the PDIU-DI/PDIU-DS PCB. If required by local codes, the FG should be connected to external ground.
- **Signal Ground (SG, Pin 7):** The SG signal (EIA circuit AB) establishes the common ground reference for all other PDIU and data device signals and must be wired for all applications.
- **Transmit Data (TD, Pin 2):** DTE devices transmit and DCE devices receive data on the TD lead (EIA circuit BA). Before the DTE device can transmit the TD signal, the RTS, CTS, DSR, and DTR signals (all discussed below) must be ON. The TD signal is OFF in the idle state.
- **Receive Data (RD, Pin 3):** The DCE device transmits data to the DTE device on the RD lead (EIA circuit BB); the DTE receives data on the RD.
- **Request to Send (RTS, Pin 4):** Some DTE devices send an RTS signal (EIA circuit CA) to the DCE device when they are ready to transmit data on the TD lead. If the DTE device does not generate the RTS signal, the DIU DIP switch **SW1-4** should be set ON to inform the DIU. Sometimes, the DTE/DCE device may use RTS/CTS for Ready/Busy type flow control, in these cases DIP switch **SW1-4** should be OFF (see Figure 7-32 for DIP switch information).
- **Clear to Send (CTS, Pin 5):** The DCE device sends the CTS signal (EIA circuit CB) which indicates that it is prepared to transmit data to the line side. The DCE device sends this signal only when it receives the RTS signal from the DTE device. Sometimes, the DTE/DCE device may use RTS/CTS for Ready/Busy type flow control; in these cases, dip switch **SW1-4** should be OFF (see Figure 7-32 for DIP switch information).
- **Data Set Ready (DSR, Pin 6)**: When connected to the communication channel and prepared to exchange control characters to initiate data transmission, the DCE device sends the DSR signal (EIA circuit CC) to the DTE device. If the PDIU DIP switch **SW1-2** is set ON, DSR will be ON continuously; if the switch is set OFF, DSR follows DTR (if DSR is ON, DTR is ON, etc.) **SW1-2** should be OFF in most cases (see Figure 7-32 for DIP switch information).
- **Data Carrier Detect (DCD, Pin 8):** The DCE device sends the DCD signal (DCD, Pin 8) when receiving the carrier signal on the line side. Before transmitting or receiving data, most DTE devices require that the DCD be ON. If the carrier signal is removed by the remote end or lost due to a fault condition on the line, the DCE notifies the DTE device by an OFF condition with the DCD signal; PDIU DIP switch **SW1-2** is set ON to set the DCD ON continuously; if set OFF, the DCD signal will only be ON when connection between two DIUs is established and OFF when a connection is not established. **SW1-2** is set OFF when the DTE/DCE uses the DTR/DSR signals for Ready/Busy flow control (see Figure 7-32 for DIP switch information).

- **Data Terminal Ready (DTR, Pin 20):** The DTE device sends the DTR signal (EIA circuit CD) to the DCE device, prompting the DCE device to open the communication line. The line is closed and the call disconnected when the DTE device quits sending the DTR signal. DTR may be sent any time to indicate that the DTE is ready to transmit or receive data. DIP switch **SW1-2** should be set OFF in most cases (see Figure 7-32 for DIP switch information).
- **Ring Indicator (RI, Pin 22):** The RI signal (EIA circuit CE) is sent by the DCE device to the DTE device. Whenever the DCE device receives a ringing signal on the line side, it turns the RI signal ON. If DIU DIP switch **SW1-3** is set ON, the RI signal will be on continuously if ringing; if the switch is set OFF, the RI signal will be one second ON/three seconds OFF when the DIU detects ringing signal.

10.30 DIP Switch Options

10.31 The PDIU-DI and the PDIU-DS each have a four-control DIP switch which can be configured for signaling options. The switch is located on the bottom of the PDIU-DI, and on the back panel of the PDIU-DS (see Figure 7-32).

- **SW1-1:** Normally this switch is set ON to disconnect devices from DIUs automatically. The connection is maintained if data is exchanged between the device and the DIU within eight to nine second intervals. If **SW1-1** is OFF on the called and calling DIU, data calls will remain connected until released manually.
- **SW1-2:** This switch is placed in the ON position when the PDIU-DI (or PDIU-DS configured like a DCE) must hold DCD and DSR ON continuously. If **SW1-2** is OFF, DSR follows DTR and DCD will be ON only when the DIU is connected on a data call to another DIU. **SW1-2** should be OFF on a DIU when it is connected to a personal computer that uses a communications software program to establish data calls with AT commands; and whenever PDIU-DS is connected to a modem.
- **SW1-3:** The PDIU-DI (or PDIU-DS configured as a DCE) sends the Ring Indicate (RI) signal to the computer to tell the computer (DTE) that the PDIU is receiving an incoming call. **SW1-3** should be ON for the DIU to send RI steady, and OFF to send at one second ON/three seconds OFF intervals.
- **SW1-4:** This switch is placed in the ON position if the computer does not output the RTS signal or when connected to a modem that tracks the DCD signal (modem set with AT&C1). Sometimes, the DTE device may use RTS/CTS for Ready/Busy flow control, in these cases **SW1-4** should be OFF. In this case the DCD signal of the calling DTE is used as the RTS lead of the called DTE and the DCD signal of the called DTE is used as the RTS signal of the other DTE. In this case a signal which stops the DTE from transmitting data (usually the CTS lead) should be cross-connected to the DIU's DCD signal. Consult the DTE device or application software documentation to determine which type of flow control is required. If the DIU-DS is connected to a modem that tracks carrier detect (AT&C1) SW1-4 should be ON.

10.40 PDIU-DI to Personal Computer (PC) Installation

10.41 The PDIU-DI always functions as a DCE device; it transmits data on the Receive Data lead (RD) and receives data on the Transmit Data lead (TD). Most personal computers function as a DTE device; PCs transmit data on the TD lead and receive data on the RD lead. Follow the steps below to install the PDIU-DI to a DTE, PC:

NOTES:
1. *Use the steps below when installing an ASCII terminal, personal computer, or any other DTE device to a PDIU-DI.*
2. *The PDIU-DI can connect to a DCE computer or any other DCE-type device using a specially configured RS-232 cable or adapter; but this application is rarely required.*
3. *Change the PDIU-DI escape sequence per the guidelines in paragraph 10.63.*

1) Install the digital telephone that is to be equipped with PDIU-DI per the instructions in Section **100-816-206** and the drawing in Section **100-816-208**.

2) Install the PDIU-DI under the digital telephone per the instructions in Section **100-816-206**.

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NOTE:
The PDIU-DI always operates as a DCE device; therefore, unlike the PDIU-DS, it has no internal jumpers.

3) Connect the appropriate RS-232 cable between the PDIU-DI's DB-25 female connector and the PC's appropriate asynchronous serial communications port connector (COM port).

IMPORTANT NOTE!
Check the PC manufacturer's serial communication port interface documentation for correct RS-232 pin requirements; requirements vary with each manufacturer. The number of EIA RS-232 signals required (8, 9, or 10 wires) depends on the application. When EIA signal requirements are not known, connect the 10 EIA signals listed in Paragraph 10.20. Figures 7-25 and 7-30 provide diagrams for connecting RS-232 cables between PDIU-DIs and Toshiba lap top, and IBM, XT and AT PCs.

4) Set the PDIU-DI DIP switch (**SW1-1** ~ **4**) for the desired application. Figure 7-32 shows the DIP switch locations and Paragraph **10.30** describes switch functions.

5) Access **Program 20** to configure the PDIU-DI for DTE-type connection and **Program 39** for data button assignments of the digital telephone connected to the PDIU-DI.

Program 20

- The port number entered for the PDIU-DI in **Program 20** is the port number of the digital telephone to which the PDIU-DI is connected.
- **LED 01**: Should always be ON for PDIU-DI ports.
- **LED 02**: Should be ON for PDIU-DI ports, unless the PC user will never use DIU AT commands (other than ATDD, ATDT, and ATD) and never require the PDIU-DI to send result codes to display on the PC display screen. Frequently, it is difficult to determine the full extent of these requirements; so it is recommended to turn LED 02 ON. See the *Data Interface User Guide* for information regarding DIU AT commands and result codes.
- **LEDs 03 and 04:** Should be OFF for PDIU-DI ports.
- **LED 05**: Should be ON if the system is installed behind a PBX or Centrex that uses access codes to make external calls or to insert a pause following DIU access of an outside line.
- **LEDs 17 ~ 20**: Used to establish data security groups. PDIU stations are only allowed to make calls to PDIUs in the same data group to which they are assigned.

Program 39

- The following data call buttons can be assigned digital telephones equipped with PDIU-DIs: **Data Call**, and **Modem.** Assign **SD** buttons to data devices as required. Do not assign **DSS** buttons to data devices; **DSS** buttons are used for voice calls only.

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10.50 PDIU-DS to Printer Installation

10.51 STRATA DK8 and DK16 enables serial printers (laser, dot matrix, or other types) to be connected to stand-alone data interface units (PDIU-DSs). Digital telephones equipped with PDIU-DIs can share access to these printers. Serial printers operate as DCE or DTE devices, depending on the vendor; the PDIU-DS can be connected to either type, since it can be configured as a DTE or DCE device. (The PDIU-DS comes from the factory configured as a DCE device.) Follow the steps below to install the PDIU-DS to a serial printer.

NOTES:
1. *Only serial printers (not parallel) that conform to EIA RS-232 signaling requirements can be connected to PDIU-DSs.*
2. *In rare applications, it may be desired to connect printers to PDIU-DIs. Refer to the printer's installation instructions.*

1) Consult the serial printer's documentation and determine if the printer operates as a DCE or DTE device:
   - If the printer is a DCE device: Disassemble the PDIU-DS and configure it to operate like a DTE device by placing the jumper plugs (**P1** ~ **P9**) in the "B-C" (MODEM) position. Reassemble the PDIU-DS, and mark "B-C" on the bottom identification label for future reference. (Paragraph **10.70** provides PDIU-DS disassembly/assembly instructions, and Figure 7-31 provides jumper plug information.)
   - If the printer is a DTE device: It may not be necessary to disassemble the PDIU-DS, since it comes direct from the factory configured as a DCE device. However, if uncertain, disassemble the PDIU-DS and verify that jumper plugs (**P1** ~ **P9**) are in the "A-B" (DTE) position. Reassemble the PDIU-DS and mark "A-B" on the bottom identification label for future reference. (Paragraph **10.70** provides PDIU-DS disassembly/assembly instructions, and Figure 7-31 provides jumper plug information.)

2) Connect the PDIU-DS to the appropriate digital telephone circuit per wiring diagrams in Section **100-816-208** and information provided in Section **100-816-206**.

3) Connect the appropriate RS-232 cable between the printer and the PDIU-DS (see Figure 7-27 and 7-29 for an example printer cable connection).

4) If steps 2 and 3 are done properly, the Power and Ready LEDs on the PDIU-DS should light when the printer is turned on and ready.

5) Set the PDIU-DS DIP switch (**SW1-1 ~ 4**) for the desired application. Figure 7-32 shows the DIP switch locations and Paragraph **10.30** describes switch functions.

NOTE:
If using Toshiba computers and printers with X-On/X-OFF flow control, set SW1-(4) "ON" on the DIU connected to the computer and DIU connected to the printer.

IMPORTANT NOTE!
Check the printer's serial documentation for correct RS-232 pin requirements. The requirements vary with each manufacturer.

6) Use **Program 20** to configure the PDIU-DS to connect to a serial printer (see Programming Section **100-816-302** for instructions and record sheets).
   - **LED 01**: Should always be ON for PDIU-DS ports.
   - **LED 02**: Should be OFF for PDIU-DS ports connected to printers.
   - **LED 03**: Should be OFF for PDIU-DS ports that connect to DTE- or DCE-type printers.
   - **LED 04**: Should always be ON for PDIU-DS ports.
   - **LED 05**: Should be OFF for PDIU-DS ports connected to printers.
   - **LEDs 17 ~ 20**: Data security groups can be used to allow or deny digital telephones equipped with PDIU-DIs access to PDIU-DS ports connected to a printer. DIU stations can only make data calls to DIUs in the same data security group.

7) **Program 22** should be used to configure PDIU-DSs to hunt if more than one PDIU-DS connected to the same printer/server.

10.60 PDIU-DS to Modem Installation

10.61 STRATA DK16 enables asynchronous-type (not synchronous) modems to be connected to PDIU-DSs. This allows PDIU-DI equipped digital telephones that are connected to personal computers, terminals, and other devices to share access to a modem or modem pool.

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IMPORTANT NOTE!
Modems must be "smart modems" that respond to AT commands and return result codes. Modems are customer-supplied.

10.62 A modem(s) can be accessed internally for outgoing data calls or externally for incoming data calls. Modems operate as DCE devices; so PDIU-DSs that are connected to them must be configured to operate like a DTE device. In the example installation in Figure 7-24, the line side of the two modems are connected to KSTU/PSTU/PESU ports to establish a modem pool; however, the line side of modems could be connected directly to a dedicated CO line. If modems are connected directly to telephone network CO lines, automatic transfer of CO line voice calls to system modems (data call) will not function as described in the *Data Interface User Guide*. For best operation and utilization of CO lines and modems, it is recommended to connect modems to QSTU, PSTU or KSTU standard station ports in a modem pool configuration. The RS-232 side of the modem connects to the PDIU-DS with standard RS-232 cables; the PDIU-DS line side (RJ-11 connector) always connects to its own individual digital port. Use the following instructions to install modems to PDIU-DSs.

1) Configure the PDIU-DS as a DTE device: Disassemble the PDIU-DS and place jumper plugs **P1** ~ **P9** in the "B-C" position (MODEM). Reassemble the PDIU-DS and mark "B-C" on the bottom identification label for future reference. (Paragraph **10.70** provides PDIU-DS disassembly/assembly instructions and Figure 7-31 provides jumper plug information.)

2) Connect the PDIU-DS to the appropriate Digital port circuit per the wiring diagrams in Section **100-816-208**.

3) Connect the appropriate RS-232 cable between the modem and the PDIU-DS. Figure 7-28 shows an example PDIU-DS to "smart modem" RS-232 connection.

IMPORTANT NOTE!
All ten PDIU-DS EIA leads (signals) should be connected to the modem. Consult the modem's documentation for correct RS-232 pin requirements; the requirements may vary with each manufacturer.

4) Connect the line side of the modem to a QSTU, PSTU, KSTU or PESU standard telephone circuit or a dedicated CO line (consult the modem's documentation to install the it to a CO line). Section **100-816-208** provides QSTU, KSTU/PESU/PSTU station port wiring information.

5) Set the PDIU-DS DIP switch (**SW1-1 ~ 4**) for the desired application. Figure 7-32 shows the DIP switch location and Paragraph **10.30** describes switch functions.

NOTE:
If the modem tracks carrier detect (DCD, AT&C1), SW1(4) should be "ON," and SW1(2) should be OFF when PDIU-DS is connected to a modem.

6) Use the programs below to configure the PDIU-DS to connect to an asynchronous modem (see Programming Section **100-816-302** for explanations and record sheets).

Program 20

- **LED 01**: Should always be ON for PDIU-DS ports
- **LED 02**: Should be ON for PDIU-DS ports connected to modems, enabling the use of AT commands and result codes when incoming calls are made from outside the system to modems connected to PDIU-DSs.
- **LED 03**: Should be set ON for PDIU-DS ports connected to modems.
- **LED 04**: Should always be ON for PDIU-DS ports.
- **LED 05**: Should be ON if the system is installed behind a PBX/Centrex that uses

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access codes to place outgoing trunk calls.

- **LED 06**: Should be ON for DIUs connected to modems. With this feature turned on, the DIU will send a one-second release signal on the DTR to drop the modem when the data user presses the **Data Release** button on the telephone.
- **LEDs 17 ~ 20**: Data security groups can be used to allow or deny digital telephones equipped with PDIU-DIs access to the PDIU-DS ports connected to a modem. DIU stations can only make data calls to DIUs in the same data security group.

Program 21

- For each PDIU-DS/modem pair, assign the digital, QSTU, KSTU, and PSTU (or PESU) ports that will be connected to the PDIU-DS and modem, respectively.

Program 22/33

- If more than one modem/PDIU-DS pair is configured as a system modem pool, the PDIU-DSs should be set to hunt each other in **Program 22**. The modem QSTU, PSTU, KSTU, or PESU ports should be set to hunt each other in **Program 33**.

Program 31

- LED 18 should be turned on for all QSTU, KSTU, PESU or PSTU station ports that are connected to modems. This provides data security by preventing executive or privacy override of modem calls.

10.63 Modem Setup Recommendations

1) Always change the escape sequence of the telephone PDIU-DI from default (+++) to some other ASCII character (ATS2=XX command to PDIU-DI). This allows placing the PDIU-DI or modem into the command mode selectively. The ATS2=XX command should be in the modem initialization command of the communication software of the PC connected to the PDIU-DI (XX = new ASCII Escape character). This will ensure that the new Escape sequence is restored if the telephone or PDIU-DI is unplugged.

2) Set the modem to recognize the DTR signal to disconnect (AT&D2 command to modem).

3) When the modem tracks the DCD signal, issue AT&C1 command to modem.

10.70 PDIU-DS Disassembly and Assembly

10.71 To set the jumper plugs (**P1** ~ **P9**) on the PCB inside the PDIU-DS for DCE or DTE operation, the PDIU-DS must be disassembled. Disassemble the PDIU-DS in accordance with the following steps:

10.72 Disassembling the PDIU-DS

1) Remove the four screws securing the bottom panel to the rest of the unit (see Figure 7-33). These screws are not captive; so place together where they can be easily accessed.

2) Remove the bottom panel.

3) Remove the PCB inside the PDIU-DS by lifting the back panel from its side grooves.

4) Turn the PCB over and set the jumper plugs (**P1** ~ **P9**) as follows:
   - If the PDIU-DS is connected to a DTE, set the plugs to the “A-B” position.
   - If the PDIU-DS is connected to a DCE device, set the plugs to the “B-C” position.

NOTE:
Do not cut PDIU-DS PERCEPTION jumper wire for STRATA DK8 or DK16 installations.

10.73 Assembling the PDIU-DS

1) Position the back panel to the PCB (see Figure 7-33).

2) Slide the back panel down into its side grooves.

3) Attach the bottom panel, and secure with the four non-captive screws.

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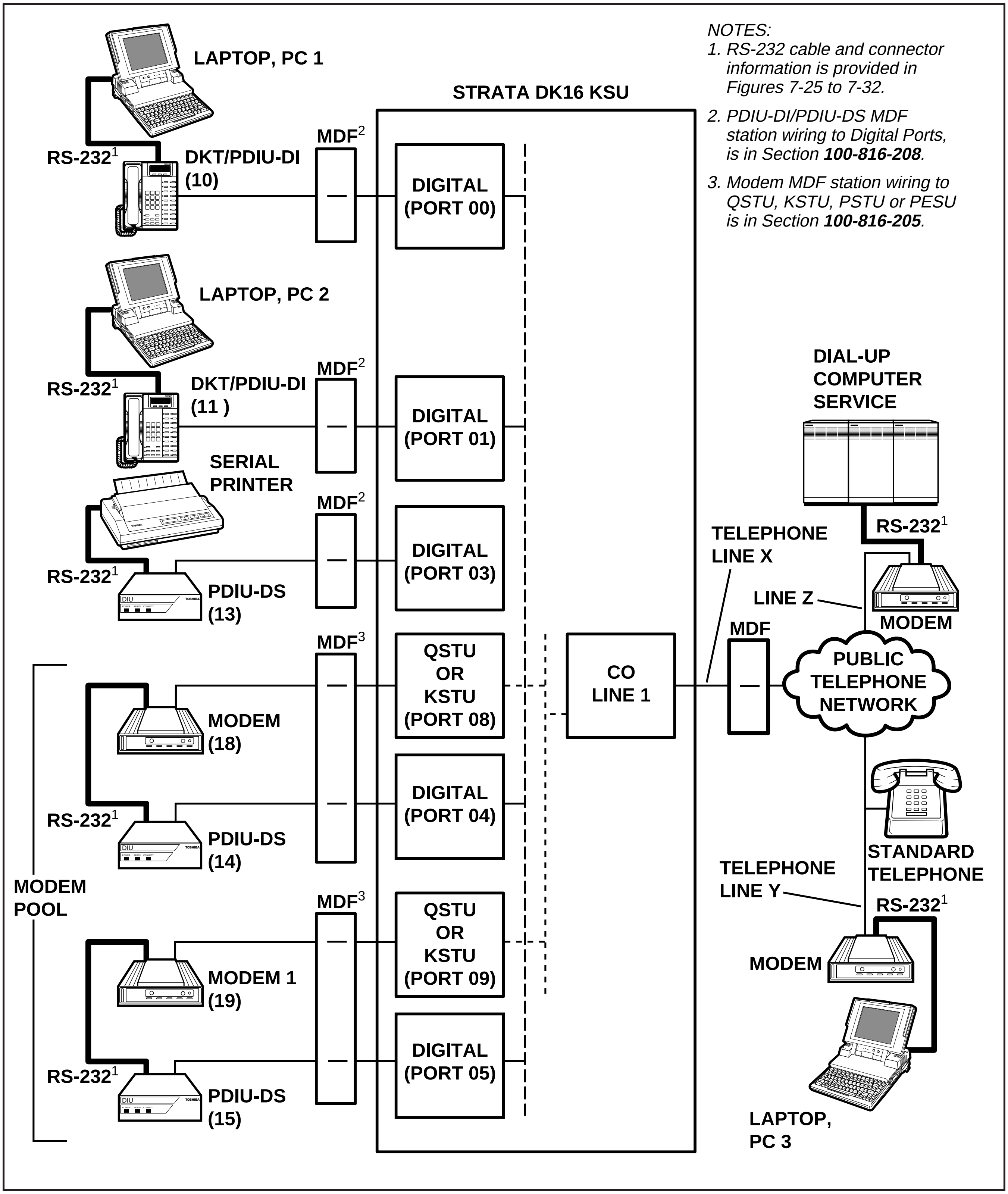


FIGURE 7-24
DK8 OR DK16 DATA INSTALLATION EXAMPLE BLOCK DIAGRAM

TOSHIBA LAPTOP OR IBM AT-TYPE PERSONAL COMPUTER (DTE)
PIN DESIGNATIONS

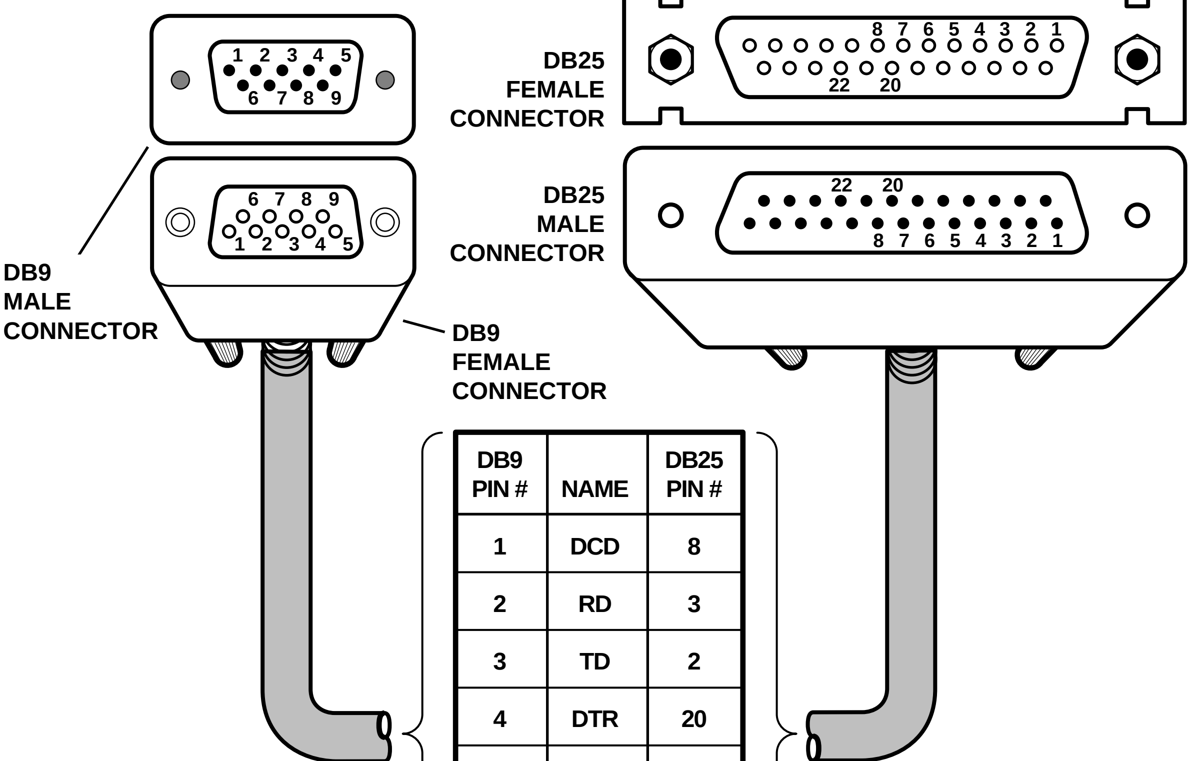
COM PORT PIN #	1	2	3	4	5	6	7	8	9
NAME	DCD	RD	TD	DTR	SG	DSR	RTS	CTS	RI

PDIU-DI (FUNCTIONS LIKE A DCE)
PIN DESIGNATIONS

PDIU-DI PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

Rear view of asynchronous (serial) communication interface connector (DB9) of Toshiba laptop or IBM AT personal computer

Rear view of PDIU-DI DB25, RS-232 female connector



DB9 PIN #	NAME	DB25 PIN #
1	DCD	8
2	RD	3
3	TD	2
4	DTR	20
5	SG	7
6	DSR	6
7	RTS	4
8	CTS	5
9	RI	22

IBM PC AT modem style (serial) DB25 to DB9, RS-232 cable. Pin to pin connections are configured as a straight cable, not as a null modem cable (50 ft max, 24AWG; customer-supplied).

NOTES:
1. Some RS-232 EIA leads may be called by other names by some manufacturers.
2. The computer receives data on Pin 2 (RD) and sends data on Pin 3 (TD).

FIGURE 7-25
DK8 AND DK16 PDIU-DI TO IBM AT-TYPE COMPUTER, RS-232 CONNECTOR/CABLE CONNECTIONS

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IBM XT PERSONAL COMPUTER OR ASCII TERMINAL (FUNCTIONS LIKE A DTE)

DB25 PIN DESIGNATIONS

PDIU-DI PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

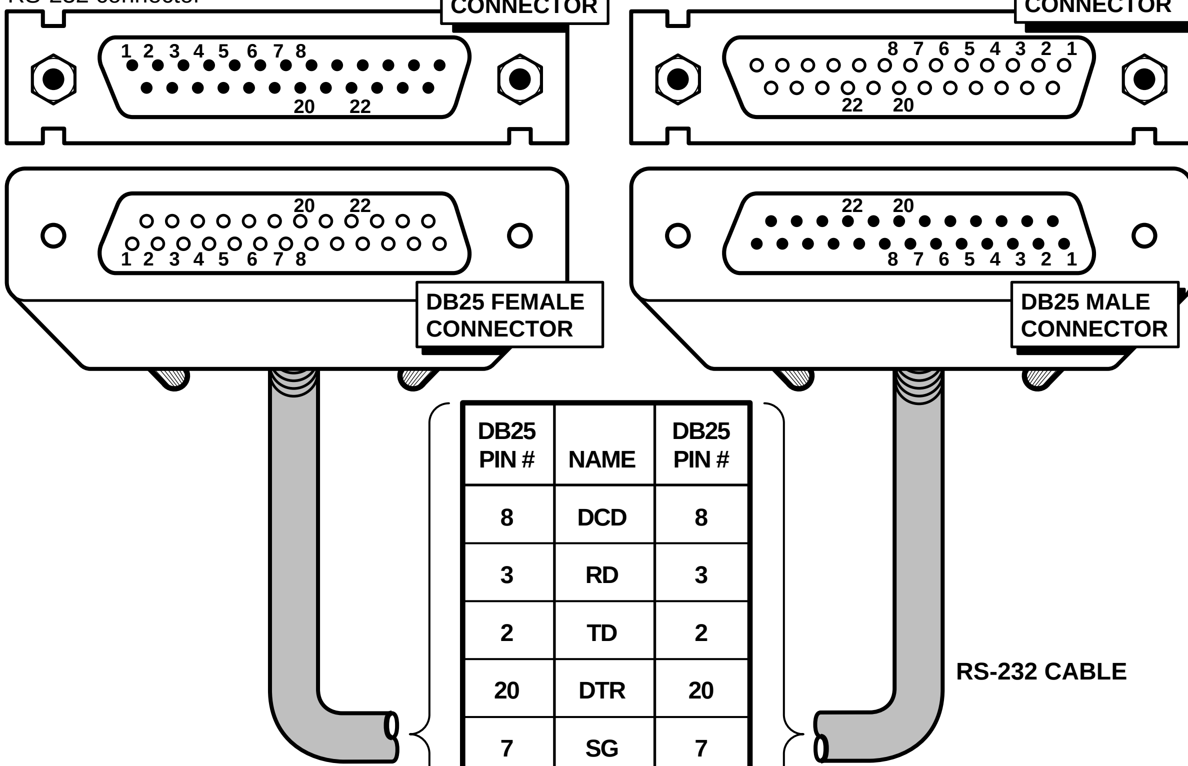
PDIU-DI (FUNCTIONS LIKE A DCE)

DB25 PIN DESIGNATIONS

PDIU-DI PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

Rear view of personal computer or ASCII terminal DB25, RS-232 connector

Rear view of PDIU-DI DB25, RS-232 female connector



DB25 PIN #	NAME	DB25 PIN #
8	DCD	8
3	RD	3
2	TD	2
20	DTR	20
7	SG	7
6	DSR	6
4	RTS	4
5	CTS	5
22	RI	22
1	FG	1

IBM PC XT modem style (serial) DB25 to DB25 (M/F) RS-232 cable (50 ft max, 24 AWG, customer-supplied).

NOTE:
The PC/ASCII terminal receives data on Pin 3 (RD) and transmits data on Pin 2 (TD).

FIGURE 7-26
DK8 AND DK16 PDIU-DI TO IBM XT-TYPE COMPUTER, RS-232 CONNECTOR/CABLE CONNECTIONS

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TOSHIBA PS321SL PRINTER (FUNCTIONS LIKE A DTE)

DB25 PIN DESIGNATIONS

PRINTER PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	N/C	DSR	SG	DCD	DTR	RI

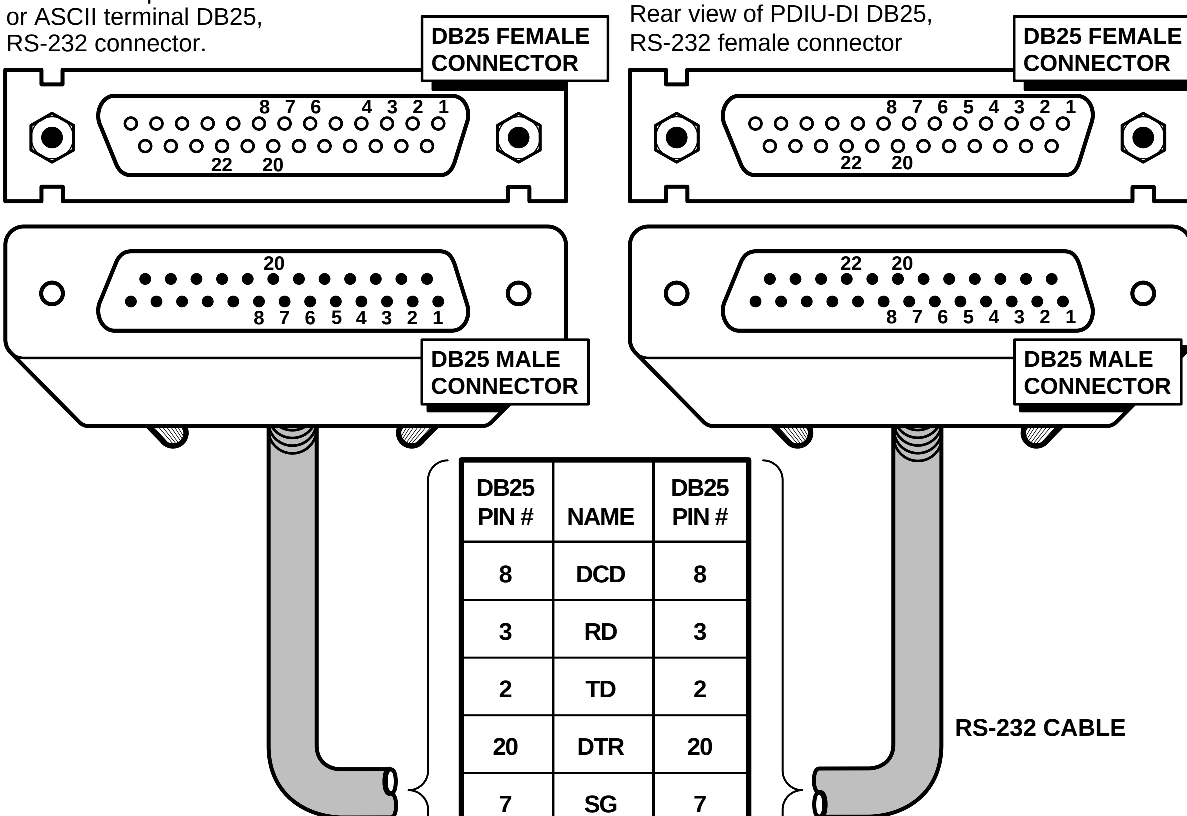
PDIU-DS (CONFIGURED IN THE "CONNECT TO DTE" MODE: P1 ~ P9 = A-B SO PDIU FUNCTIONS LIKE A DCE)

DB25 PIN DESIGNATIONS

PDIU-DS PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

Rear view of printer or ASCII terminal DB25, RS-232 connector.

Rear view of PDIU-DI DB25, RS-232 female connector



DB25 PIN #	NAME	DB25 PIN #
8	DCD	8
3	RD	3
2	TD	2
20	DTR	20
7	SG	7
6	DSR	6
4	RTS	4
N/C	CTS	5
N/C	RI	22
1	FG	1

RS-232 CABLE

(50 ft max, 24 AWG; customer supplied).

NOTES:

1. *The printer receives data on Pin 3 (RD) and transmits data on Pin 2 (TD).*
2. *The PDIU-DS should be in the connect-to-DTE mode (**P1 ~ P9** are strapped A-B), so that it transmits data on Pin 3 (RD) and receives data on Pin 2 (TD).*

FIGURE 7-27
DK8 AND DK16 PDIU-DS TO TOSHIBA PRINTER, RS-232 CONNECTOR/CABLE CONNECTIONS

HAYES-TYPE SMART MODEM
(FUNCTIONS LIKE A DCE)

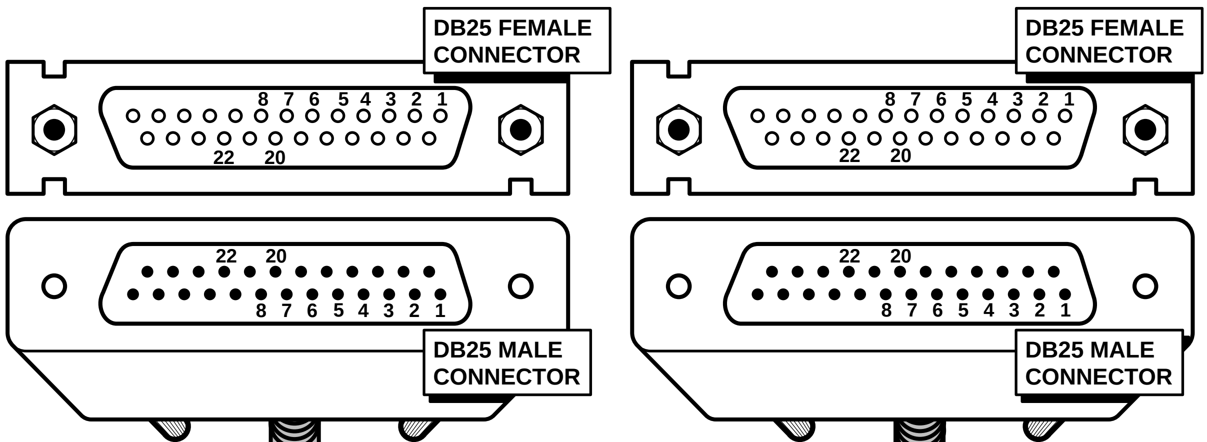
MODEM PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

PDIU-DS
(CONFIGURED IN THE "CONNECT TO MODEM" MODE, P1 ~ P9 = B-C, SO IT FUNCTIONS LIKE A DTE)

PDIU-DS PIN #	1	2	3	4	5	6	7	8	20	22
NAME	FG	TD	RD	RTS	CTS	DSR	SG	DCD	DTR	RI

Rear view of modem DB25 connector

Rear view of PDIU-DS DB25, connector



DB25 PIN #	NAME	DB25 PIN #
8	DCD	8
3	RD	3
2	TD	2
20	DTR	20
7	SG	7
6	DSR	6
4	RTS	4
5	CTS	5
22	RI	22
1	FG	1

RS-232 CABLE

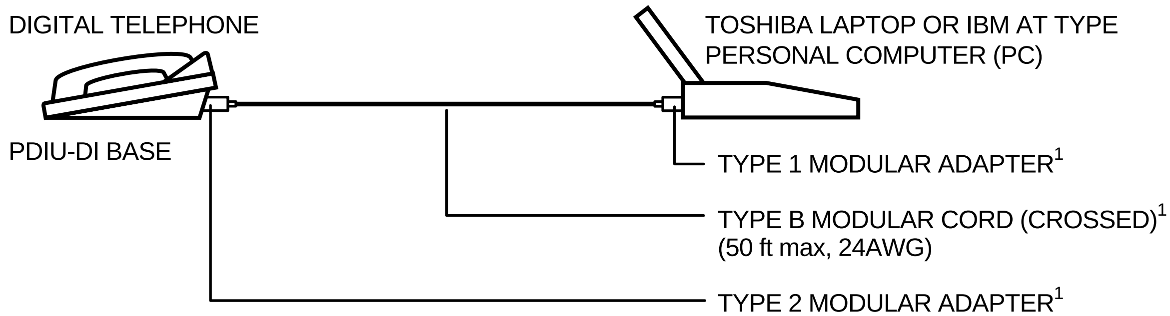
(50 ft max, 24 AWG; customer supplied)

NOTES:
1. Modem receives data on pin 2 (TD) and transmits data on pin 3 (RD).
*2. The PDIU-DS must be in the connect to modem mode (**P1 ~ P9** strapped B-C) so that it transmits data on pin 2 (TD) and receives data on pin 3 (RD).*

FIGURE 7-28
DK8 AND DK16 PDIU-DS TO HAYES-TYPE SMART MODEM, RS-232 CONNECTOR/CABLE CONNECTIONS

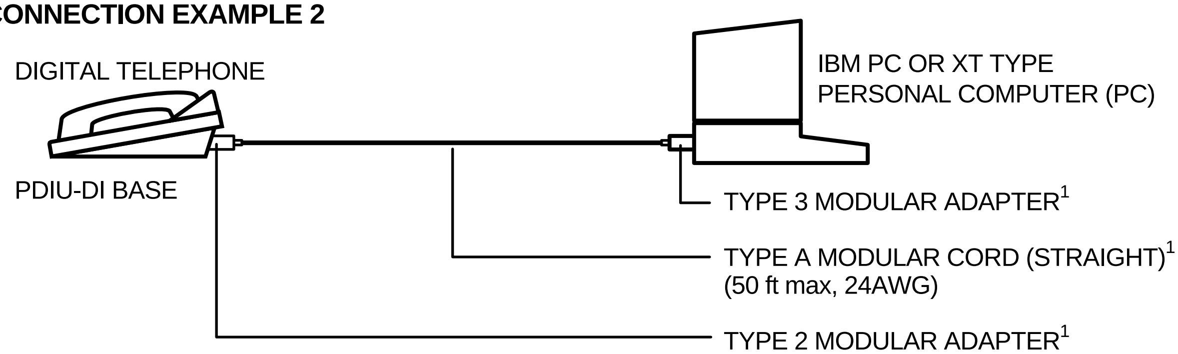
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CONNECTION EXAMPLE 1



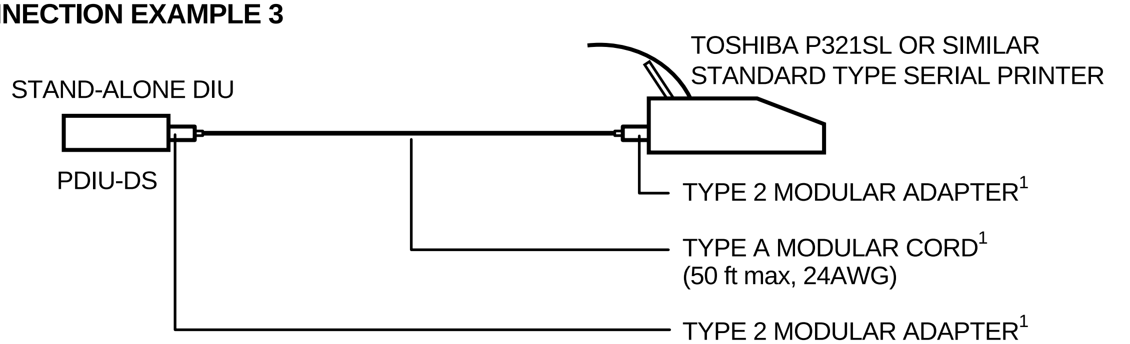
IMPORTANT!
Will not function with applications that require the RI signal to PC.

CONNECTION EXAMPLE 2



IMPORTANT!
Will not function with applications that require the RI signal to PC.

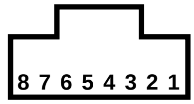
CONNECTION EXAMPLE 3



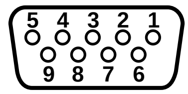
NOTES:
1. *See Figure 7-30 for detailed pin out information of modular cords and adapters.*
2. *Never use modular cords and adapters when connecting a PDIU-DI/PDIU-DS to a modem.*
3. *Connection examples 1 and 2 work when using the PDIU-DI to make calls with personal computer applications (auto-dialers, printer sharing, outgoing modem calls, etc). If the PC PDIU-DI must receive calls, the RI lead is normally required; therefore, a standard RS-232 cable must be used (see Figures 7-25 and 7-28).*
4. *In Connection Example 3, PDIU-DS must be in the connect to DTE mode (**P1 ~ P9**, strapped A-B).*
5. *All modular cords and adapters are customer-supplied.*

FIGURE 7-29
DK8 AND DK16 PDIU-DI/PDIU-DS MODULAR CABLE/RJ-45 ADAPTER CONNECTIONS

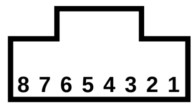
TYPE 1
RJ45 TO DB9 (FEMALE) ADAPTER



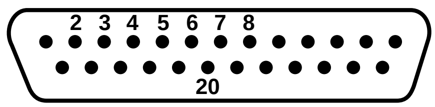
8	7	6	5	4	2	1	N/C	RJ45
DSR	RTS	RD	DCD	TD	GND	CTS	RI	LEAD NAME
6	7	2	1	3	5	8	9	DB9



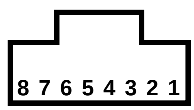
TYPE 2
RJ45 TO DB25 (MALE) ADAPTER



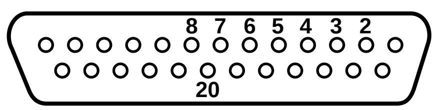
8	7	6	5	4	3	2	1	N/C	RJ45
CTS	SG	DTR	TD	DCD	RD	RTS	DSR	RI	LEAD NAME
5	7	20	2	8	3	4	6	22	DB25



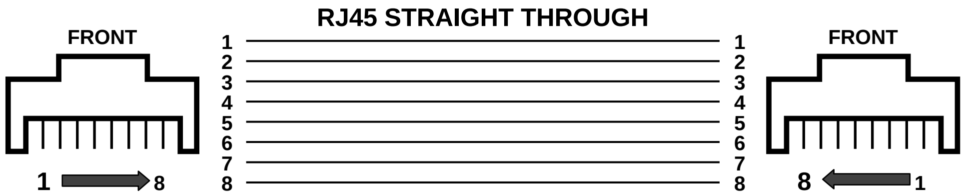
TYPE 3
RJ45 TO DB25 (FEMALE) ADAPTER



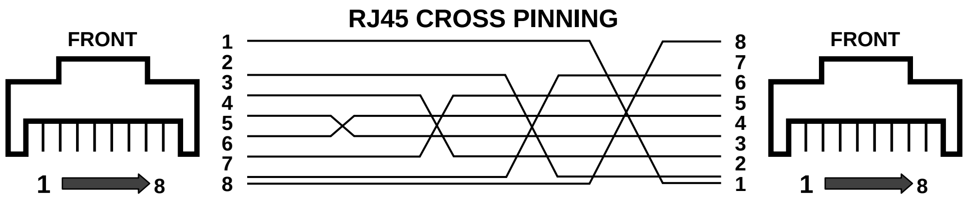
8	7	6	5	4	3	2	1	N/C	RJ45
CTS	SG	DTR	TD	DCD	RD	RTS	DSR	RI	LEAD NAME
5	7	20	2	8	3	4	6	22	DB25



TYPE A
RJ45 FLAT MODULAR CORD (STRAIGHT)

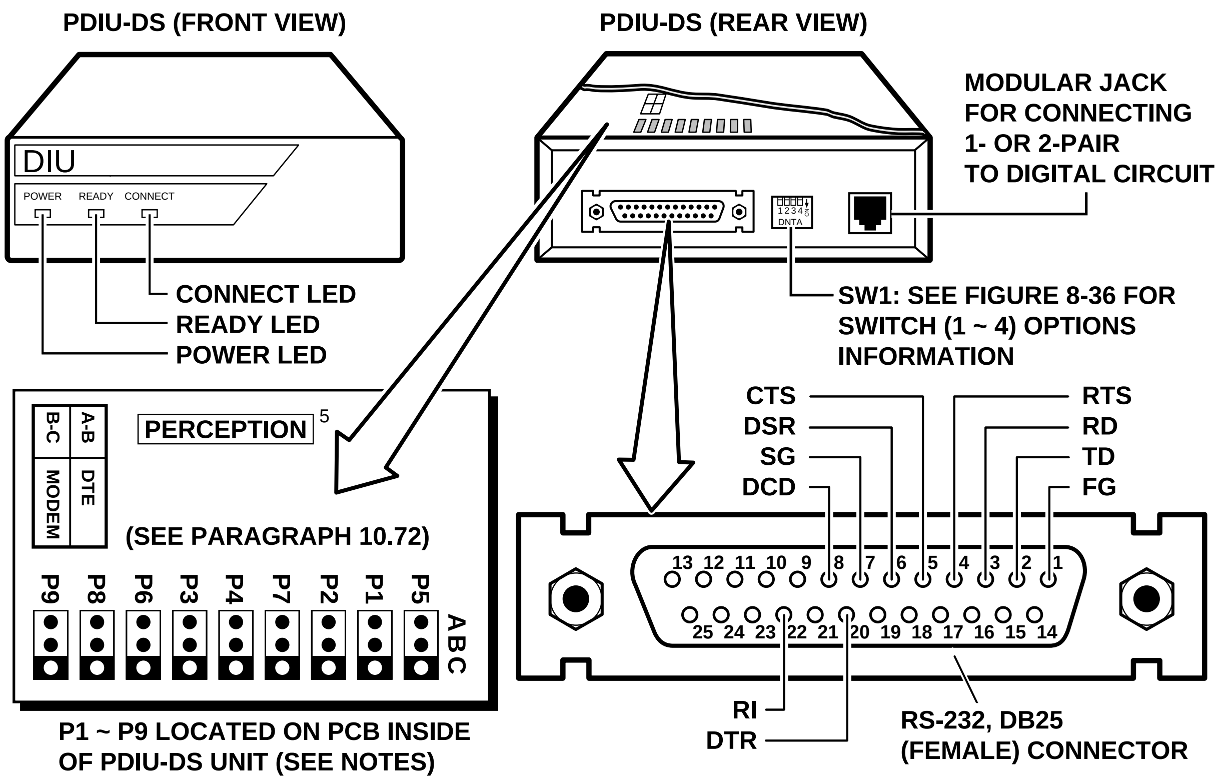


TYPE B
RJ45 FLAT MODULAR CORD (CROSSED)



Modular Cords (50 ft max, 24AWG; customer-supplied)

FIGURE 7-30
DK8 AND DK16 PDIU-DI/PDIU-DS MODULAR CORDS AND RJ-45/RS-232 ADAPTER PIN CONNECTIONS

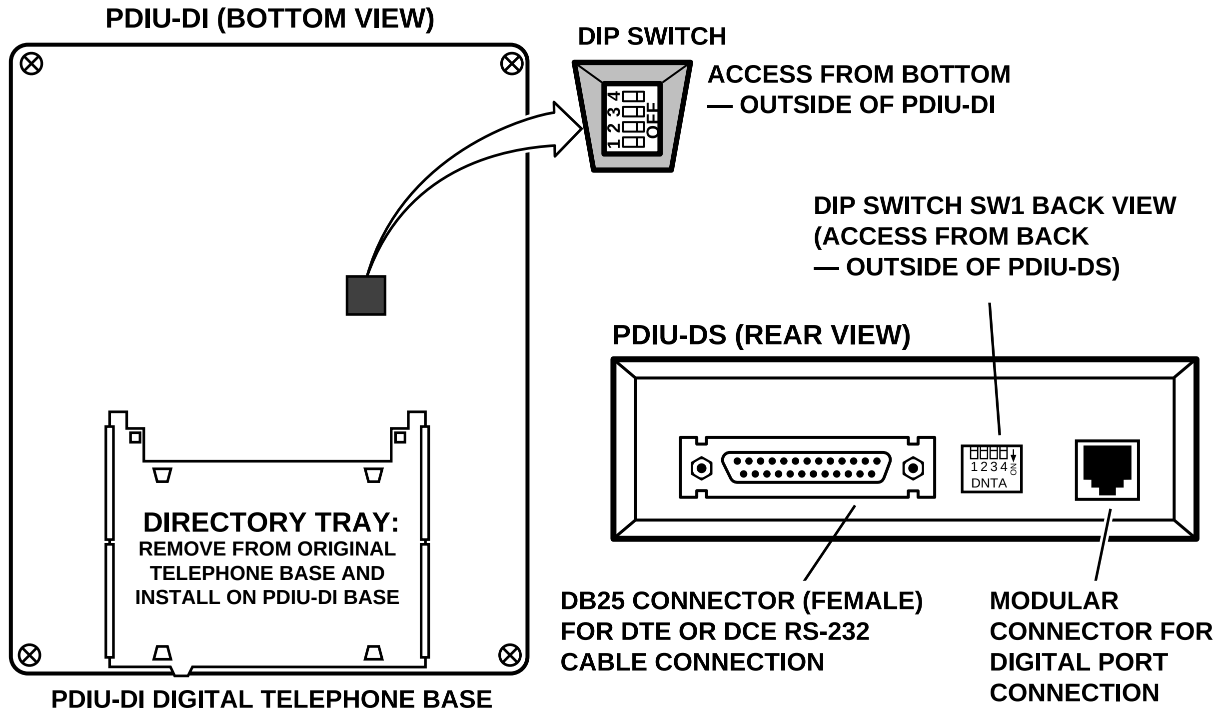


			SIGNAL DIRECTION AND FUNCTION OF P1 ~ P9			
			PDIU-DS CONNECTED TO DTE		PDIU-DS CONNECTED TO DCE	
SIGNAL ABBREVIATON	SIGNAL NAME/ FUNCTION	PDIU-DS PIN NO.	SIGNAL DIRECTION	FUNCTION: A-B (DTE MODE)	SIGNAL DIRECTION	FUNCTION: B-C (MODEM MODE)
FG	FRAME GROUND	1				
SG	SIGNAL GROUND	7				
TD	TRANSMIT DATA	2	DTE ➡ DIU	P1	MODEM ⬅ DIU	P1
RD	RECEIVE DATA	3	DTE ⬅ DIU	P2	MODEM ➡ DIU	P2
RTS	REQUEST TO SEND	4	DTE ➡ DIU	P6	MODEM ⬅ DIU	P6
CTS	CLEAR TO SEND	5	DTE ⬅ DIU	P7/P5	MODEM ➡ DIU	P7/P5
DSR	DATA SET READY	6	DTE ⬅ DIU	P4	MODEM ➡ DIU	P4
DTR	DATA TERMINAL READY	20	DTE ➡ DIU	P3	MODEM ⬅ DIU	P3
DCD	DATA CARRIER DETECT	8	DTE ⬅ DIU	P8	MODEM ➡ DIU	P8
RI	RING INDICATOR	22	DTE ⬅ DIU	P9	MODEM ➡ DIU	P9

NOTES:

1. *Mode select* ***(P1 ~ P9)*** *"A-B" if PDIU-DS is connected to a terminal-type device (DTE).*
2. *Mode select* ***(P1 ~ P9)*** *"B-C" if PDIU-DS is connected to a modem-type device (DCE).*
3. *See Figure 7-33 to disassemble/assemble PDIU-DS.*
4. *Some RS-232 leads go by different names depending on the equipment manufacturer.*
5. *Do not cut the Perception strap when installing a PDIU-DS in Strata DK systems.*

FIGURE 7-31
DK8 AND DK16 PDIU-DS JUMPER PLUG OPTIONS/RS-232 CONNECTOR INFORMATION



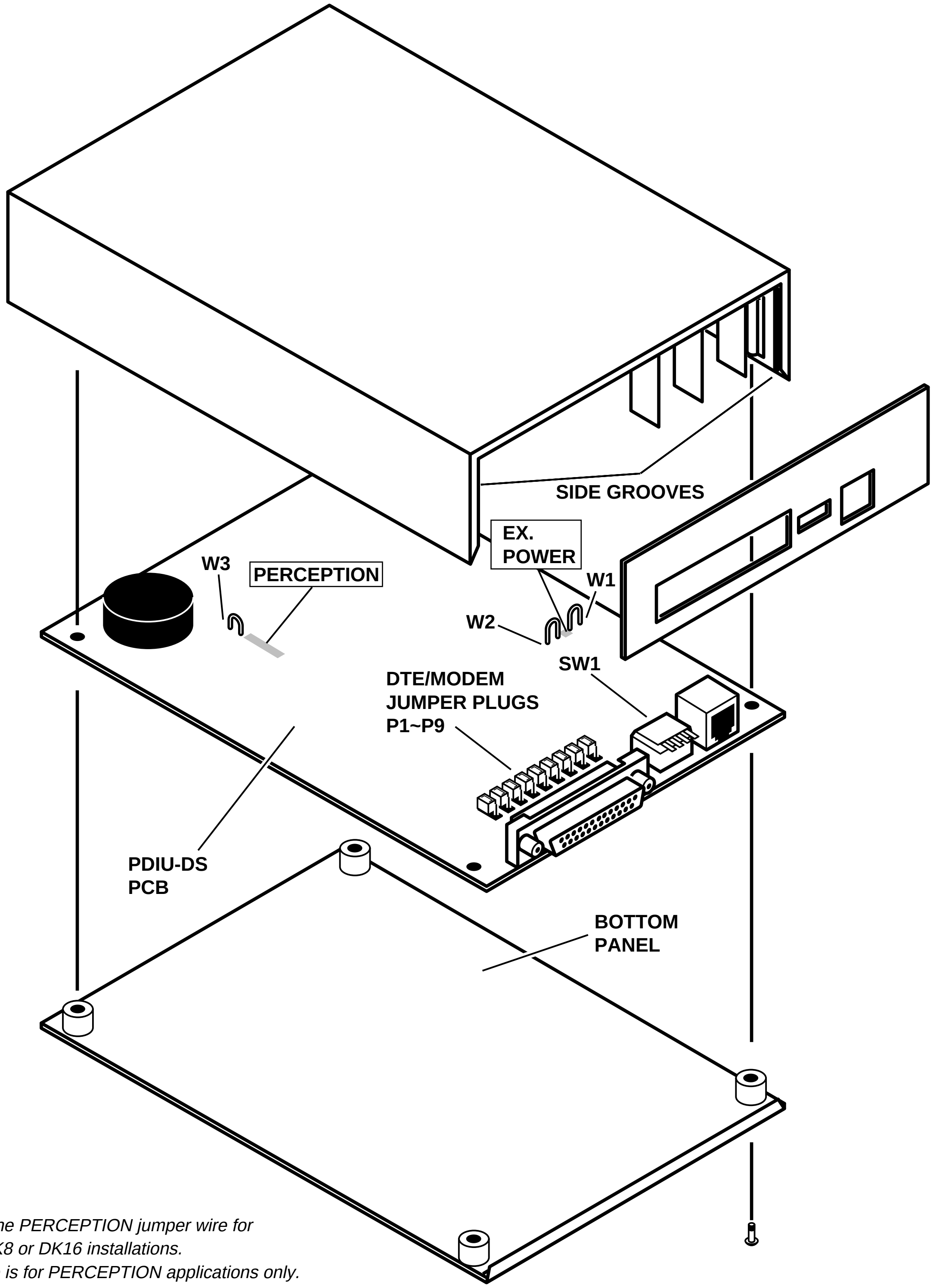
PDIU-DI AND -DS SW1 DIP SWITCH (1 ~ 4) FUNCTIONS

SWITCH	FUNCTION	INITIAL POSITION
SW1 (1)	Forced hang up when DIU does not detect space signal on TD or RD for about 9 minutes ON: enable (auto-disconnect)[1] OFF: disable	OFF
SW1 (2)	DCD, DSR control ON: continuous on OFF: DSR depends on DTR (DCD is on during communication state)	OFF
SW1 (3)	RI control ON: RI is on continuously during ringing state OFF: RI is 1 sec ON/3 sec OFF during ringing state	OFF
SW1 (4)	RTS control ON: DTE doesn't have RTS signal OFF: DTE has RTS signal (ready/busy flow control: RTS/CTS:DCD)	OFF

NOTES:

1. *DIU port must have LED 02 ON in **Program 20** to enable auto disconnect.*
2. *See Paragraphs **10.20** and **10.30** for more details regarding **SW1** option settings.*
3. *When a PDIU-DS is connected to a modem that tracks the DCD signal (AT&C1) SW1(4) must be ON.*
4. *If using Toshiba Personal Computers and Toshiba Printers using X-ON/X-OFF flow control, set SW1(4) ON on PDIU-DIs and -DSs.*
5. *SW1(2) should be off when PDIU-DS is connected to a modem.*

FIGURE 7-32
DK8 AND DK16 PDIU-DI/PDIU-DS SW1 DIP SWITCH INFORMATION



NOTES:

1. *Do not cut the PERCEPTION jumper wire for STRATA DK8 or DK16 installations. Jumper wire is for PERCEPTION applications only.*
2. *See **Table 8-D** regarding external power requirements.*

FIGURE 7-33
DK8 AND DK16 PDIU-DS DISASSEMBLY/ASSEMBLY DIAGRAM

10.80 PDIU-DI/PDIU-DS Installation Tests

10.81 Paragraphs **10.82** ~ **10.86** provide tests for five DIU call applications. The telephone and port numbers used in these figures are provided for explanation purposes only; when actually testing, use port and telephone numbers appropriate for the system. Each of these tests can be conducted with manual dialing from a digital telephone's dialpad or AT dialing from a personal computer's keyboard; however, only the preferred method of dialing for application is presented.

10.82 PC-to-PC Test Call Using AT Commands (see Figure 7-34)

1) DIU Programming:
   - **Program 20**: Ports 00 and 01. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   - **Program 39**: Ports 00 and 01. **Data Call** (56) and **Data Release** (54) buttons should be provided.
   - Default settings for PDIU-DI S-Registers.

2) Make sure PC 1 and PC 2 are on-line with a communications software package and that the communication parameters of each PC and communication software package are set to the same values (data transmission rate, parity, data bits, stop bits, flow control, etc.).

3) From PC 1's keyboard, type **A T D D 1 1** and press **ENTER** (AT commands must be capital letters).
   - The Data Call LEDs will be lit on DKT 10 and 11
   - PC 1 displays, CONNECT XXXX.
   - PC 2 displays, RING.
   - PC 1 and PC 2 are connected as shown by the thick solid lines. PDIU-DIs are now in the communication mode.

4) Typing from PC 1 keyboard will display on PC 2 display and vice versa.

5) To terminate the call: Press **Data Release**, or;
   a) Type XXX from either PC keyboard.
      - The PC screen displays, OK.

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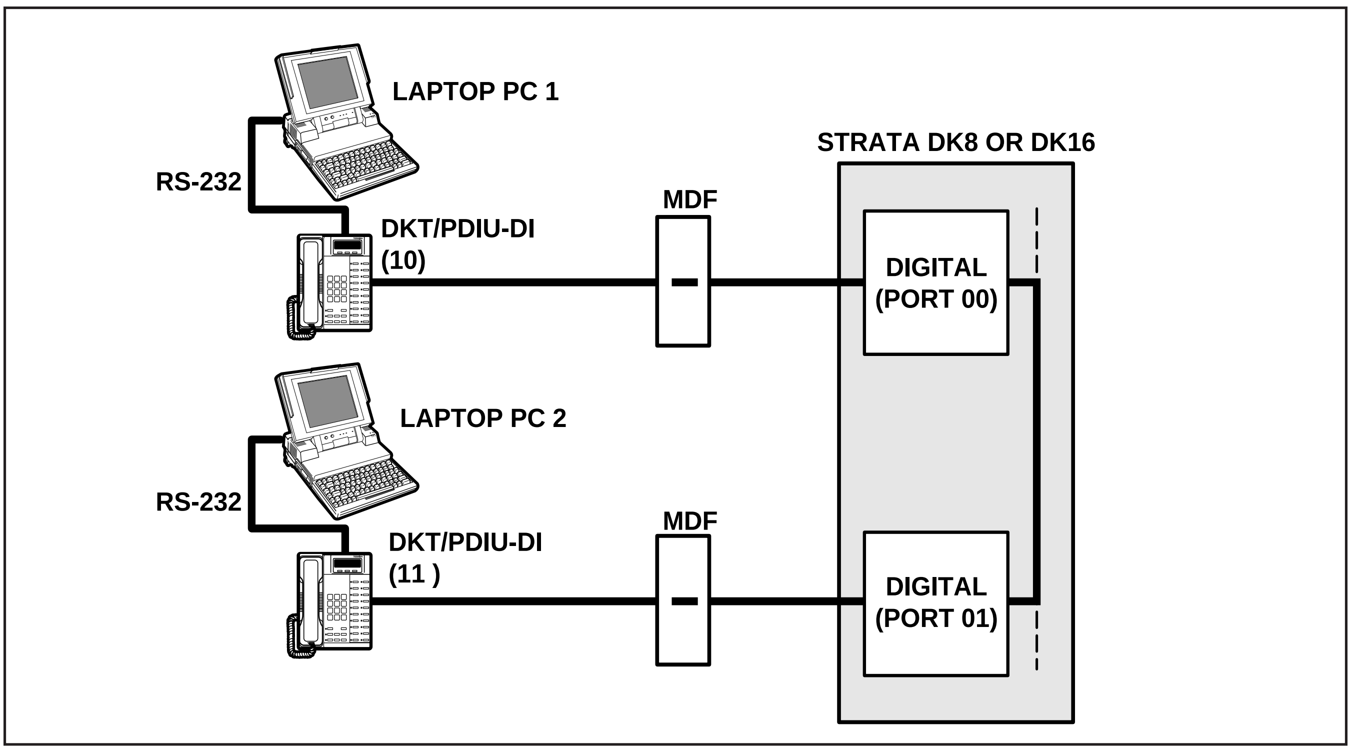


FIGURE 7-34
DK8 AND DK16 PC TO PC TEST CALL USING AT COMMANDS

b) Type **A T H** from the PC keyboard used in step 5a.
- PC 1 and PC 2 screens both display, NO CARRIER.
- The Data Call LEDs on each DKT are off.

XXX = PDIU-DI escape sequence (see *Paragraph 10.63***)**

10.83 PC to Printer Test Call Using Manual Dialing (see Figure 7-35)

1) DIU Programming:
- **Program 20**: Port 01. LEDs 01, 02, and 17 ON; all other LEDs OFF.
- **Program 20**: Port 03. LEDs 01, 04, and 17 ON; all other LEDs OFF.
- **Program 39**: Port 01. **Data Call** (56) and **Data Release** (54) buttons should be provided.
- Default settings for PDIU-DI, S-Registers.

2) Make sure the PC is configured to print data from its serial COM port (the PC COM port connected to DKT/PDIU-DI port 01). This is normally accomplished using the DOS and MODE commands.

3) Using the manufacturer's documentation, make sure the communication parameters (data speed, parity, data bits, stop bits, etc.) of the PC COM port match the printer's serial interface parameters.

4) To connect the PC to the printer, press the DKT's **Data Call** button and dial **1 3**.
- The CONNECT on the PDIU-DS will be lit.
- The connection between the PC and the printer is completed, as shown by the thick lines above (PDIU-DS 13 is in the communication mode).
- If busy tone is sent to the DKT, the connection is not complete; press **Data Release** and try step 4 again.

5) Operate the PC to print data as required.

6) To terminate the call, press the DKT's **Data Release** button.

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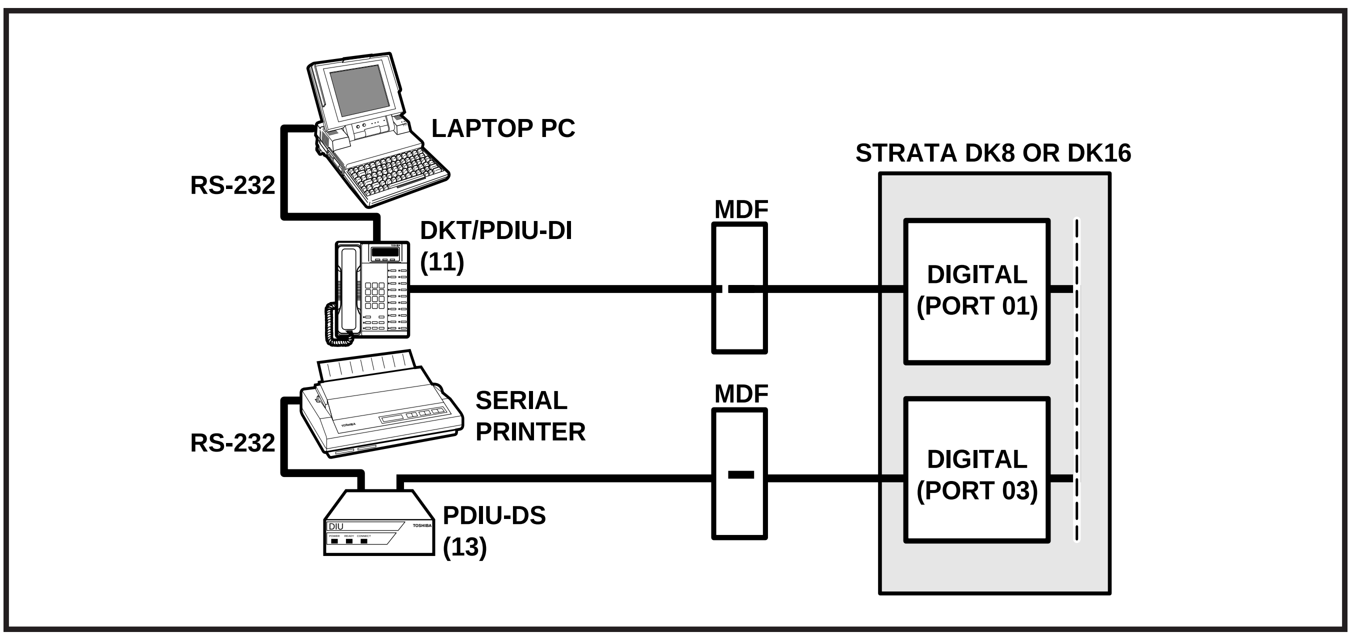


FIGURE 7-35
DK8 AND DK16 PC TO PRINTER TEST CALL USING MANUAL DIALING

10.84 Internal PC to External PC Test Call Using AT Commands (see Figure 7-36)

1) DIU Programming:
   - **Program 20**: Port 00. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   - **Program 20**: Port 04. LEDs 01, 02, 03, 04, 06, and 17 ON; all other LEDs OFF.
   - **Program 21**: Digital port 04 assigned with KSTU port 08.
   - **Program 39**: Port 00. **Data Call** (56), **Data Release** (54), and **Modem** (55) buttons should be provided.
   - Default settings for PDIU-DI and PDIU-DS S-Registers.

2) Make sure PC 1 and PC 2 are on-line with a communications software package and that the communication parameters of each PC and communication software package are set to the same values (data transmission rate, parity, data bits, stop bits, flow control, etc.).

3) From PC 1's keyboard, type **A T D D 1 4** and press **ENTER** (AT commands must be capital letters).
   - The Data Call LED on DKT 14 will be lit.
   - The CONNECT LED on PDIU-DS 14 will be lit.
   - The screen on PC 1 displays, CONNECT XXXX, where XXXX is the data transmission speed set by the communications software.
   - At this time, PC 1 and PDIU-DS 14 are connected as shown by the thick lines above (PDIU-DS 14 is in the communication mode); PC 1 is now linked directly to the RS-232 side of the internal modem; PC 1 can issue AT commands to the internal modem, which is now in the command mode.
   - If Digital/PDIU-DS port 04 is the only DIU port connected to the modem (**Program 20**, LED 03 ON), the Modem LEDs on all DKTs will be lit.

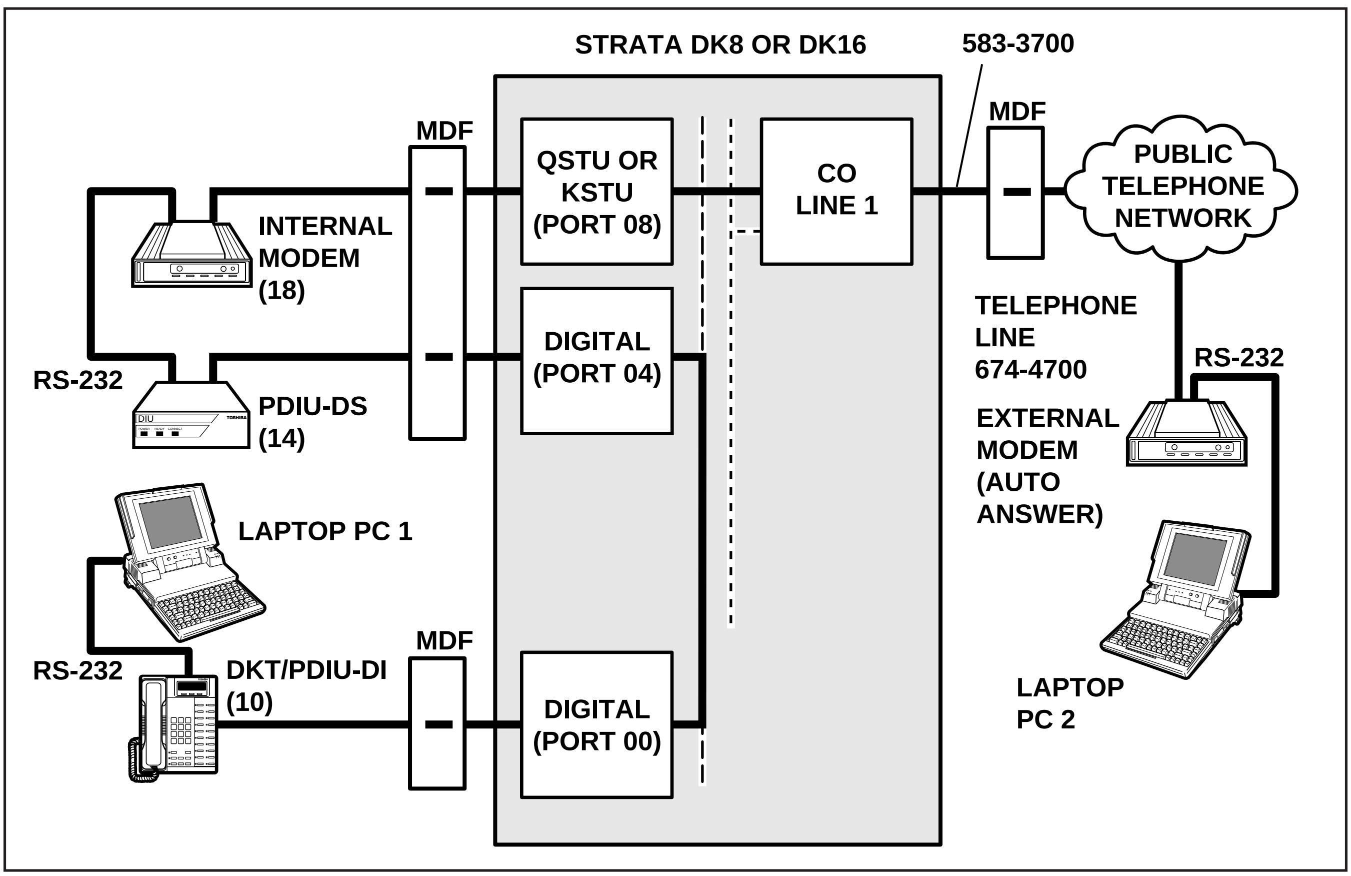


FIGURE 7-36
DK8 AND DK16 INTERNAL PC TO EXTERNAL PC TEST CALL USING AT COMMANDS

4) From PC 1's keyboard, type **A T D T 7 0 1 6 7 4 4 7 0 0** and press **ENTER**.
   - The internal modem (18) goes off-hook, dials 701 to seize the CO line, and then dials the external modem's telephone number (674-4700).
   - The external modem rings and auto answers; the modems handshake and establish communications.
   - If the modems send result codes, the screen on PC 1 displays, CONNECT XXXX, where XXXX is the data transmission speed set by the communication software.
   - At this time PC 1 and PC 2 are connected, as shown by the thick lines above, to exchange data (file transfers, type messages, etc.).

5) To terminate the call: Press the telephone **Data Release** button and;
   a) Type **+ + +** from PC2 keyboard.
      - The PC screen displays, OK.
   b) Type **A T H** from the PC keyboard used in step 5a.
      - PC 1 and PC 2 screens both display, NO CARRIER.
      - The Data Call LED on DKT 10 will be unlit.

10.85 External PC to Internal PC Test Call Using AT Commands (see Figure 7-37)

1) DIU Programming:
   - **Program 20**: Port 00. LEDs 01, 02, and 17 ON; all other LEDs OFF.

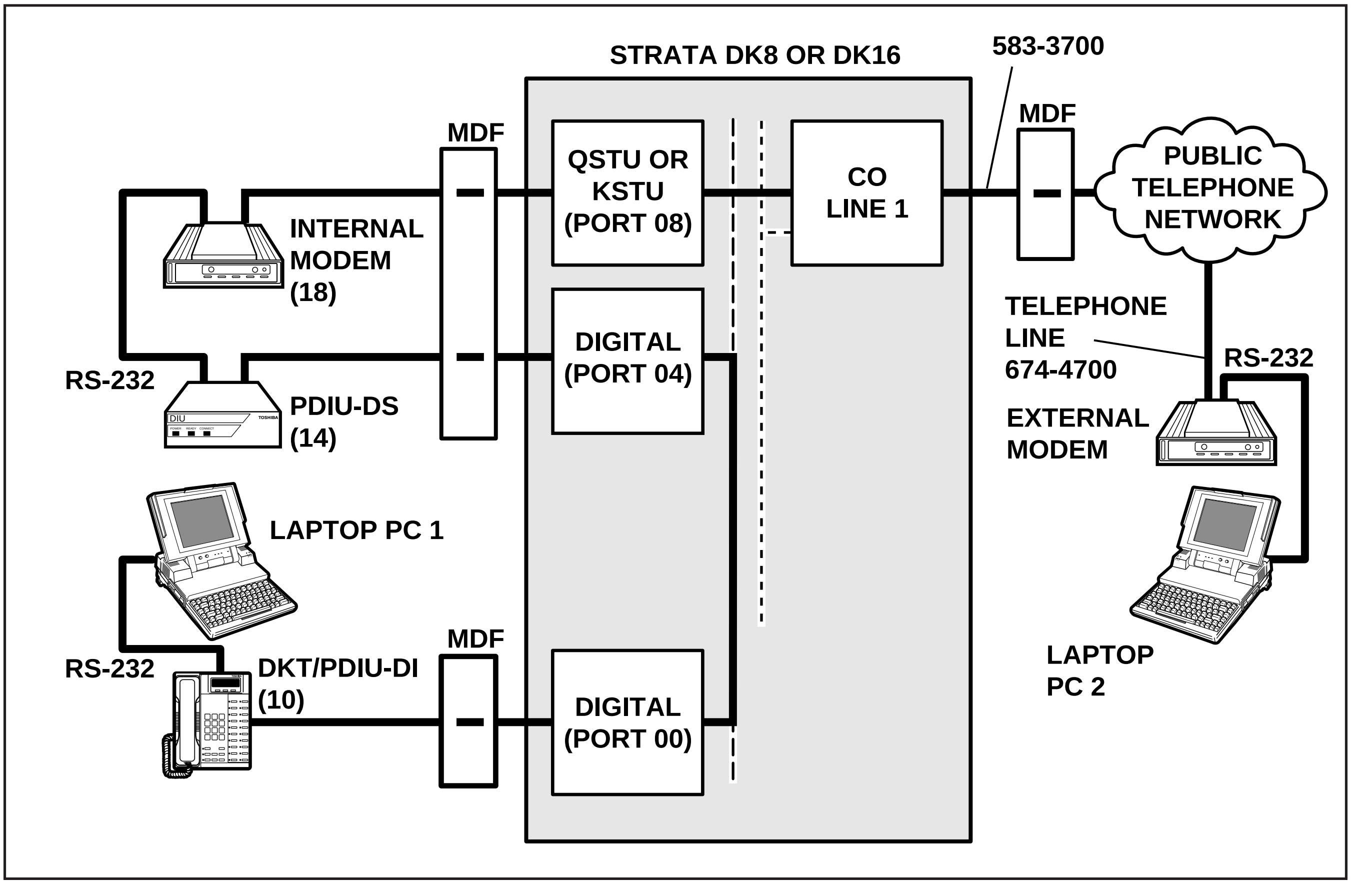


FIGURE 7-37
DK8 AND DK16 EXTERNAL PC TO INTERNAL PC TEST CALL USING AT COMMANDS

- **Program 20**: Port 04. LEDs 01, 02, 03, 04, 06, and 17 ON; all other LEDs OFF.
- **Program 21**: Digital port 04 assigned with PSTU port 08.
- **Program 39**: Port 00. **Data Call (**56), **Data Release** (54), and **Modem** (55) buttons should be provided.
- **Program 81**: Port 08. LED 01 ON (CO line 01 rings QSTU/KSTU port 08).
- Internal modem: set to auto answer (S0=1).
- Default settings for PDIU-DI and PDIU-DS, S-Registers.

2) Make sure PC 1 and PC 2 are on-line with a communications software package and that the communication parameters of each PC and communication software package are set to the same values (data transmission rate, parity, data bits, stop bits, flow control, etc.).

3) From PC 2's keyboard, type **A T D T 5 8 3 3 7 0 0** and press **ENTER**.
   - The external modem originates the call to STRATA DK16 CO line 01.
   - CO line 01 rings incoming to the internal modem (QSTU or KSTU port 08).
   - The internal modem rings and auto answers; the modems handshake and establish communications.
   - If the modems send result codes, the PC's screens display, CONNECT XXXX, where XXXX is the data transmission speed set by the communications software.
   - At this time, PC 2 is connected to PDIU-DS (14), as shown by the thick lines above (PDIU-DS 14 is in the command mode). PC 2 can now issue AT commands to PDIU-DS 14.
   - If Digital/PDIU-DS port 04 is the only PDIU port connected to a modem (**Program 20**, LED 03 ON), then the Modem LEDs on all DKTs will light.

4) From PC 2's keyboard, type **A T D D 1 0** and press **ENTER** (AT commands must be capital letters); this prompts PDIU-DS (14) to dial and connect to PDIU-DI (10).
   - The CONNECT LED on the PDIU-DS (14) will be lit; the Data Call and Modem LEDs on DKT 10 will also be lit.
   - The screens on PC 1 and PC 2 display, CONNECT XXXX, where XXXX is the data transmission speed set by the communication software.
   - At this time, PC 1 and PC 2 are connected, as shown by the thick lines, to exchange data (file transfers, typed messages, etc.).

5) To terminate the call: Press the telephone **Data Release** button, and
   a) Type **+ + +** from PC2 keyboard.
      - The PC screen displays, OK.
   b) Type **A T H** from the PC keyboard used in step 5a.
      - PC 1's and PC 2's screens both display, NO CARRIER.
      - The DATA and MODEM LEDs on DKT 10 will turn off.

10.86 PC Auto Dial Voice Call Test (see Figure 7-38)

There are many off-the-shelf, IBM/MS-DOS compatible, desktop organizer software packages that provide an auto dialer function. One of these is the terminal resident SideKick. It is used in this section for test explanation purposes only. If you choose another auto dialer software package, the detailed response may be different than that shown here.

1) DIU Programming:
   Program 20: Port 01. LEDs 01, 02, and 17 ON; all other LEDs OFF.
   Program 39: Port 01. **Data Call** (56) and **Data Release** (54) buttons are optional; if the PDIU-DI is only used for the PC auto dial application, the **Data Call** and **Data Release** buttons are unnecessary.

2) Make sure that the auto dial application software is installed on the PC root directory and that the communication parameters of the PC and application software are set to the same values (in this test example, Sidekick "SKINSTAL" program).

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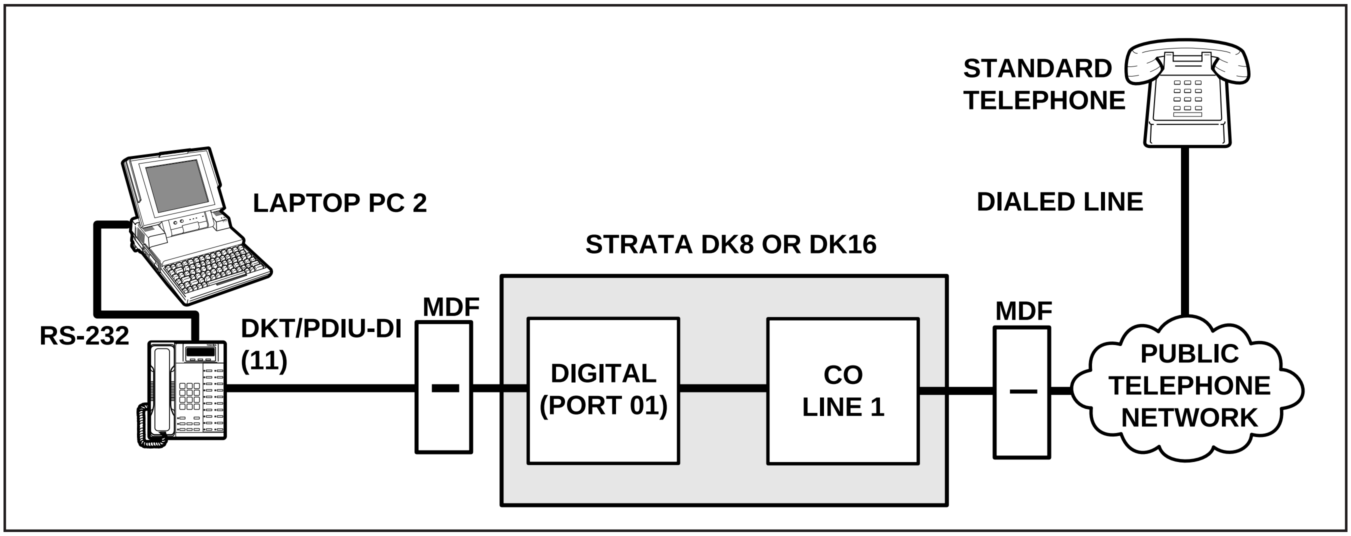


FIGURE 7-38
DK8 AND DK16 PC AUTO DIAL VOICE CALL TEST

3) Make sure that a dialing directory consisting of names and telephone numbers you wish to auto dial is installed within the application software (include the appropriate STRATA CO line access code prefixing each telephone number).

4) To auto dial using Sidekick from the PC keyboard:
   a) Press the **ALT** and **CTRL** keys simultaneously.
      - The PC screen displays the Sidekick menu window.
   b) Press **F5** twice (Sidekick prompts "search for INITials:" to display on the PC's screen).
   c) Type the initials or name of the person or organization you wish to auto dial.
   d) Press **ENTER**.
      - Sidekick finds and highlights the desired name/number.
   e) Press **ENTER** again.
      - DKT/PDIU-DI 11 seizes the appropriate CO line and auto dials the selected telephone number.
      - The LEDs of the DKT's **Data Call** and CO line 01 buttons will be lit (if assigned in **Program 39**).
      - Dial tone, DTMF tones, and ringback or busy tones are audible from the DKT's speaker.

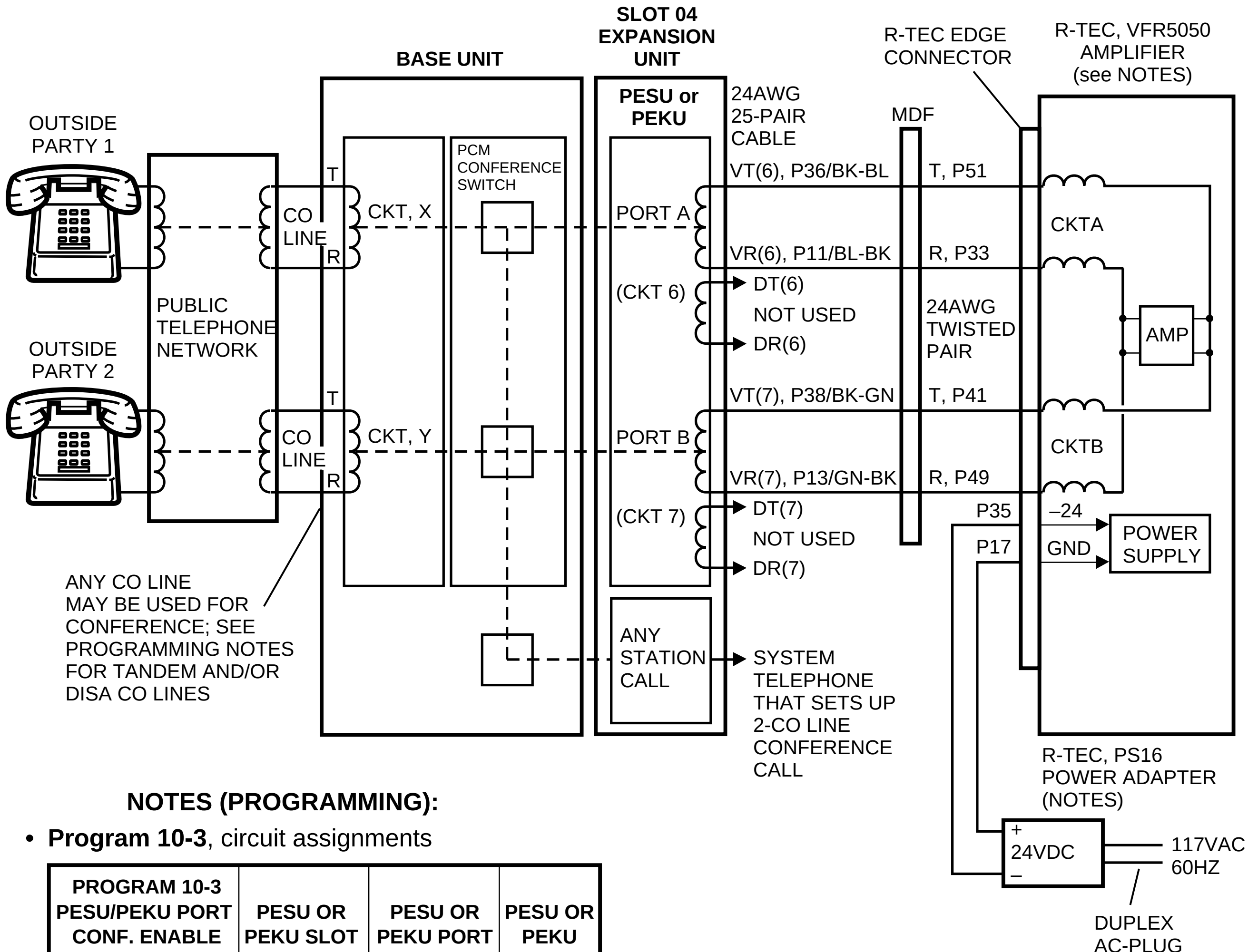
5) Take the DKT's handset off-hook at any time after the telephone number is dialed (press the **SPACE** bar to release the **Data Call** button only); or, remain on-hook and use the DKT's speakerphone to talk when the called party answers (LCD model only, do not press the **SPACE** bar when using the speakerphone).

6) To terminate the call anytime:
   a) If off-hook, press the **SPACE** bar and place the DKT handset on-hook.
   b) If talking via the speakerphone, press the **SPACE** bar.

11 DK16 TWO-CO LINE EXTERNAL AMPLIFIED CONFERENCE

11.00 General

11.01 A customer-supplied two-way amplifier can be installed to amplify two-CO line tandem, DISA, and conference calls. The amplifier will only support one call at a time: Any conference, two CO-line tandem, or DISA calls originated while the amplifier is being used for another call will be unamplified. The amplifier is connected to two designated PEKU or PESU station ports and will automatically be switched into a two-CO line connection established between any CO lines in the system.



NOTES (PROGRAMMING):

- **Program 10-3**, circuit assignments

PROGRAM 10-3 PESU/PEKU PORT CONF. ENABLE BUTTON/LED	PESU OR PEKU SLOT POSITION	PESU OR PEKU PORT NUMBER	PESU OR PEKU CIRCUIT
LED 02, **ON**	04	A = 17 B = 18	CKT6 CKT7

- **Program 10-1**, LED 19 and 20 ON.
- **Program 15-5**, enable appropriate CO lines for tandem connection.
- **Program 78-2**, enable appropriate CO lines if amplified DISA is required.
- **Program 10-2**, LED 18 and 19 ON.

NOTES (Amplifier):

1. *All amplifier equipment is customer or dealer-supplied.*
2. *Use a 2-way, telephone CO line amplifier that is FCC Part 68 registered and provides automatic gain control; the above example is with a Reliance Electric Co., R-TEC VFR5050 (VVSG) Repeater, with 500-X or 500-X-CT mounting assembly and a PS16 power adapter.*
3. *Recommended switch settings for VFR5050 are:*
   - *FLAT GAIN (1, 2, 4, 8): all ON*
   - *Equalizer (1 ~ 5): all OFF*
   - *Sensitivity: NORM*
   - *S1 screw: down = Data DIS OFF*
4. *The above R-TEC options may be different for some installations; see R-TEC VFR5050 installation Practice before installing VFR5050.*

FIGURE 7-39
DK16 AMPLIFIED TWO-CO LINE CONFERENCE AND/OR AMPLIFIED DISA FUNCTIONAL WIRING DIAGRAM

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11.02 Amplified Talk Path. Figure 7-39 provides a functional diagram of a two-CO line amplified conference connection (an R-TEC VFR5050 amplifier is used here). The talk path for the connection is as follows: outside party 1—public telephone network—CO, CKTX—STRATA DK16—PEKU, port A—into AMP, CKTA—Out AMP, CKT B—PEKU, port B—STRATA DK16—CO, CKTY—public telephone network—outside party 2. This path is two-way so when outside party 2 talks, the talk level is amplified in the reverse direction.

NOTE:
Only the outside party 1 talk path is amplified to/from a system telephone when it is connected into a two-CO line conference.

11.03 Amplifier Requirements.

- Customer-supplied.
- Must be FCC-registered, Part 68, and provide automatic gain control.
- Requires two PEKU or PESU station ports (17 and 18).
- Refer to the amplifier manufacturer's installation documentation for amplifier grounding instructions.

11.04 Installation. Connect a two-way amplifier to the STRATA DK16 system in accordance with the following steps (see Figures 7-39 and 8-27).

1) At the main distribution frame (MDF), connect the voice pair (VT, VR, port A) of circuit 6 on the designated PEKU or PESU PCB to one input of the customer-supplied two-way amplifier. In the example in Figure 7-39, this is CKTA (Central Office Side A) of the VFR5050.
2) At the MDF, connect the voice pair (VT, VR, port B) of circuit 7 on the designated PESU or PEKU PCB to the other input of the amplifier. In the Figure 7-39 example, this is CKTB (subscriber side B) of VFR5050.
3) Plug the amplifier's power cord into the 117 VAC (standard) wall outlet.
4) Set the gain and other amplifier parameters options per the amplifier manufacturer's installation documentation.
5) Program the STRATA DK16 system as follows:
   - **Program 10-3:** Enables the appropriate PEKU or PESU PCB ports for amplifier connection. Only enable the ports that will be connected with the amplifier(s).
   - **Program 15-5:** Enables appropriate CO lines for tandem connection.
   - **Program 10-1:** LEDs 19 and 20 must be ON.
   - **Program 10-2:** LED 18 and 19 must be ON.

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Strata® DK8 & DK16

INSTALLATION

CHAPTER EIGHT
WIRING DIAGRAMS

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TABLE OF CONTENTS

FIGURE LIST

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TABLE LIST

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1 GENERAL

1.00 This chapter contains point-to-point wiring diagrams for connection of telephones, lines, peripheral equipment, and power supply to the DK systems. Wiring diagrams are divided into groups according to the PCB or unit which provides the interface for, or controls the operation of, the associated equipment.

2 WIRING DIAGRAMS

2.01 The following paragraphs list and identify the wiring diagrams provided in this chapter.

2.10 Station Wiring Diagrams

- Figure 8-1 — Secondary Protector Diagram
- Figure 8-2 — DK8 MDF Wiring to KSU Amphenol Station and Relay Connections
- Figure 8-3 — DK8 MDF Wiring to CO Lines (KSU and QCDU)
- Figure 8-4 — DK8/DK16 MDF Wiring DDCB and Door Lock Control
- Figure 8-6 — DK8 and DK16 CO Line Record
- Figure 8-7 — DK8 QSMU TTY/SMDR Wiring
- Figure 8-8 — DK16 MDF Wiring/Base Unit P5 Amphenol Station and Relay Connections
- Figure 8-9 — DK16 MDF Wiring/CO Lines to Base Unit
- Figure 8-10 — DK16 MDF Wiring for Digital Telephones (DKTS) and Digital DSS Console (DDSS) to PDKU
- Figure 8-11 — DK16 MDF Wiring for Digital Telephones (DKTS) with PDIU-DI/PDIU-DI2 and PDIU-DS to PDKU, KCDU, or Base Unit
- Figure 8-12 — DK8 or DK16 PDKU, KCDU, DK8 KSU or DK16 Base KSU Digital Station/MDF Cross Connect Record
- Figure 8-13 — DK16 MDF Wiring/Electronic Telephone to PEKU
- Figure 8-14 — DK16 MDF Wiring/HDSS Console and Associated Electronic Telephone Wiring to PEKU
- Figure 8-15 — DK16 PEKU Background Music Connection
- Figure 8-16 — DK16 PEKU Station/MDF Cross Connect Record
- Figure 8-17 — DK16 MDF Wiring/Standard Telephone, Voice Mail to PSTU
- Figure 8-18 — DK16 PSTU Station/MDF Cross Connect Record
- Figure 8-21 — DK16 MDF Wiring/CO Lines to PCOU
- Figure 8-27 — DK16 MDF Wiring/Amplified Two-CO Line Conference
- Figure 8-28 — DK16 External Power for Digital Telephone Connection

2.20 CO Line Wiring Diagrams

- Figure 8-5 — DK8 QSTU/DK16 KSTU Station/MDF Cross Connect Record
- Figure 8-19 — DK16 PESU Circuit Card Wiring Diagram
- Figure 8-20 — DK16 PESU Station/MDF Cross Connect Record

2.30 PIOU and PIOUS Wiring Diagrams

- Figure 8-22 — DK16 MDF Wiring/CO Lines and Digital Telephones to KCDU
- Figure 8-23 — DK16 MDF Wiring/PIOU Peripherals (25-Pair)
- Figure 8-24 — DK16 PIOUS/TTY and SMDR Wiring
- Figure 8-25 — DK16 PIOUS Page/Relay/Alarm Connections
- Figure 8-26 — DK16 PIOU SMDR/TTY Options and Wiring

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TABLE 8-A
FCC REGISTRATION NUMBERS STRATA DK8 AND DK16

System	Manufacture Country	Key System	Hybrid System
DK16	Made in Singapore	CJ6 SNG-73672-KF-E	CJ6 SNG-73673-MF-E
DK8	Made in Malaysia	CJ6 MLA-74479-KF-E	CJ6 MLA-74478-MF-E

TABLE 8-B
STATION LOOP REQUIREMENTS

Device Description	Max Loop Resistance (Including Device)	Max Distance from KSU to Device	Number of Wire Pairs[1]
Electronic[4] telephone	40 ohms	1000 ft. (303 m)	2-pair. EKTs which receive OCA calls need 3-pair.
HDSS console	20 ohms	500 ft. (152 m)	
Standard telephones, voice mail, auto attendant, etc.	300 ohms	Approx. 3000 ft. (909 m) with 150 ohm device. See manufacturer's product specifications for exact resistance of device.	1-pair
Digital telephone *or* DDCB[3]	40 ohms	1000 ft. (303 m)	1-pair[4]
DDSS console	40 ohms	1000 ft. (303 m)	1-pair[4]
PDIU-DI PDIU-DI2	40 ohms	1000 ft. (303 m)	Shares digital telephone wire-pair.[4]
PDIU-DS	40 ohms	1000 ft. (303 m)	1-pair[4]
ADM	40 ohms	1000 ft. (303 m)	Shares digital telephone wire-pair.[4]

NOTES:
1. Use 24 AWG twisted pairs.
2. PESU circuits 3 and 4 are not used.
3. DDCB can connect only to Circuit 5 of the DK16 Base Unit or Circuit 1 of the PDKU or KCDU.
4. Two-pair, larger wire, or local telephone power supply is required to achieve maximum range, see Table 8-D.

TABLE 8-C
NETWORK REQUIREMENTS

TOSHIBA Printed Circuit Board or Interface	Facility Interface Code	Network Jack	Ringer Equivalence
QCDU/KCDU/PCOU/PCOU2 (Loop Start Line)	02LS2	RJ14C	0.2B
DK8 KSU DK16 Base KSU (Loop Slant Line)	02LS2	RJ11C	0.2B
QSTU/KSTU/PESU*/PSTU/ PSTU2 (Off-premises Station)	0L13A	RJ21X	N/A

**Circuits 1 and 2*

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TABLE 8-D
DIGITAL TELEPHONE/DIU/DDSS CONSOLE/ADM/LOOP LIMITS

MODE	QPSU/KPSU or Battery Backup[1]	Maximum line length (24 AWG)		
		1 Pair	2 Pair	1 Pair plus external power[3]
DKT Ringing (Volume Max)	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	675 ft (204 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with DVSU (OCA)	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	495 ft (150 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with HHEU or Carbon Handset	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	330 ft (100 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with PDIU-DI/ PDIU-DI2	QPSU/KPSU	495 ft (150 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	165 ft (50 m)	675 ft (200 m)	1000 ft (303 m)
PDIU-DS	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	675 ft (204 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with HHEU and PDIU-DI/PDIU-DI2	QPSU/KPSU	495 ft (150 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	33 ft (10 m)	330 ft (100 m)	1000 ft (303 m)
DDSS2060A	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	500 ft (151 m)	1000 ft (303 m)	1000 ft (303 m)
DDCB	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	500 ft (151 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with DVSU and HHEU	QPSU/KPSU	1000 ft (303 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	165 ft (50 m)	1000 ft (303 m)	1000 ft (303 m)
DKT with ADM	QPSU/KPSU	675 ft (204 m)	1000 ft (303 m)	1000 ft (303 m)
	Battery Backup	165 ft (50 m)	1000 ft (303 m)	1000 ft (303 m)

NOTES:
1. *Battery backup applies to instances when the system is being powered by batteries exclusively.*
2. *Digital telephones and other digital devices can operate at maximum lengths with two pair wiring or an external power source.*
3. *See **Figure 8-28** for external power wiring.*
4. *Digital cable runs must not have the following:*
   - *Cable splits (single or double)*
   - *Cable bridges (of any length)*
   - *High resistance or faulty cable splices*

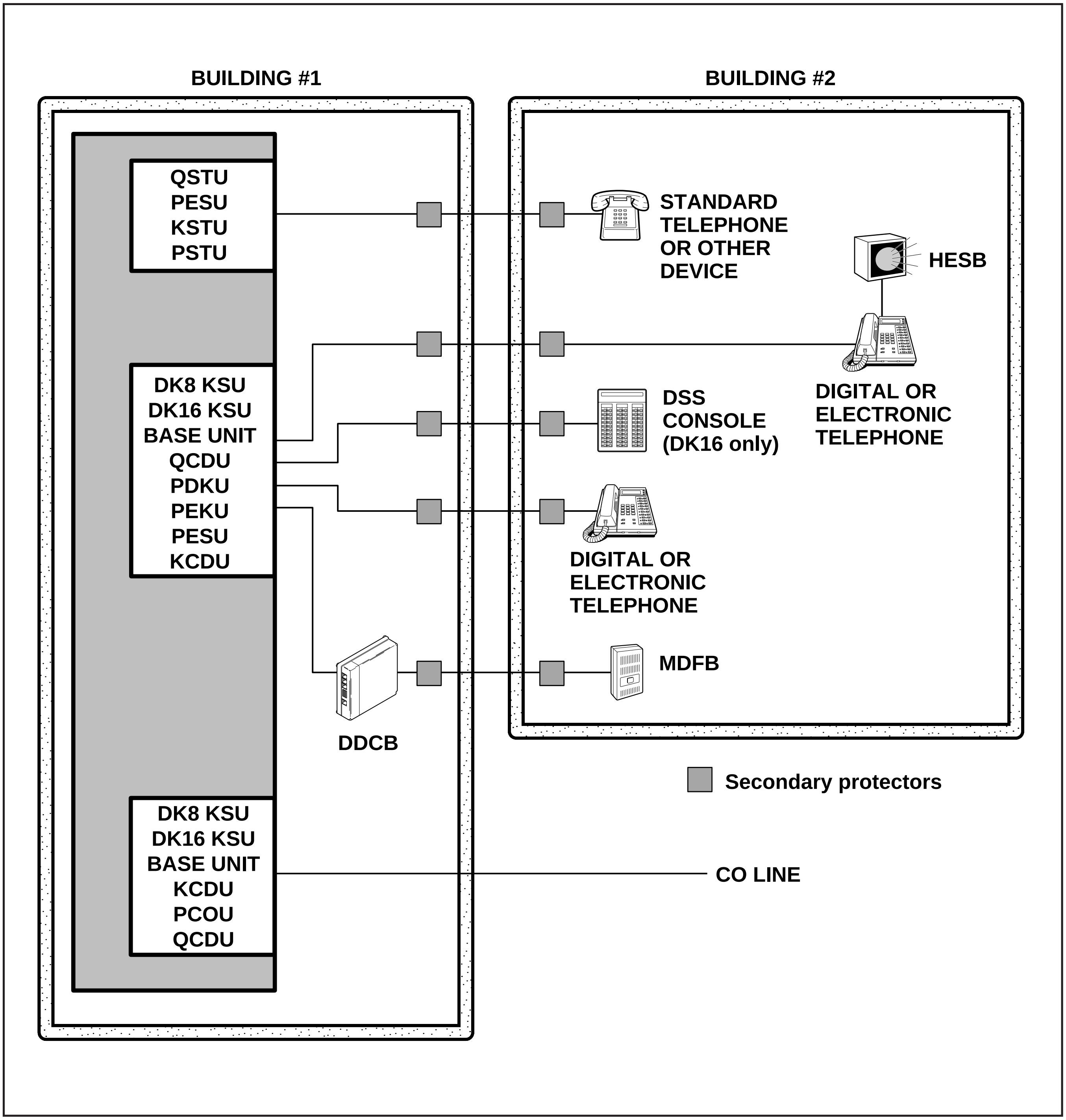


FIGURE 8-1
SECONDARY PROTECTOR DIAGRAM

IMPORTANT!
To protect against transient voltages and currents, secondary protectors must be installed if there is outside wiring (Figure 8-1). These protectors, which contain fast semiconductors in addition to fuses, shall comply with the requirements for secondary protectors for communication circuits, UL 497A. As of October 1, 1990, the following manufacturers offer secondary protectors that are UL listed.

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1. Certron Corp; Anaheim, California 92807
- *Secondary protector: Model 08450.*

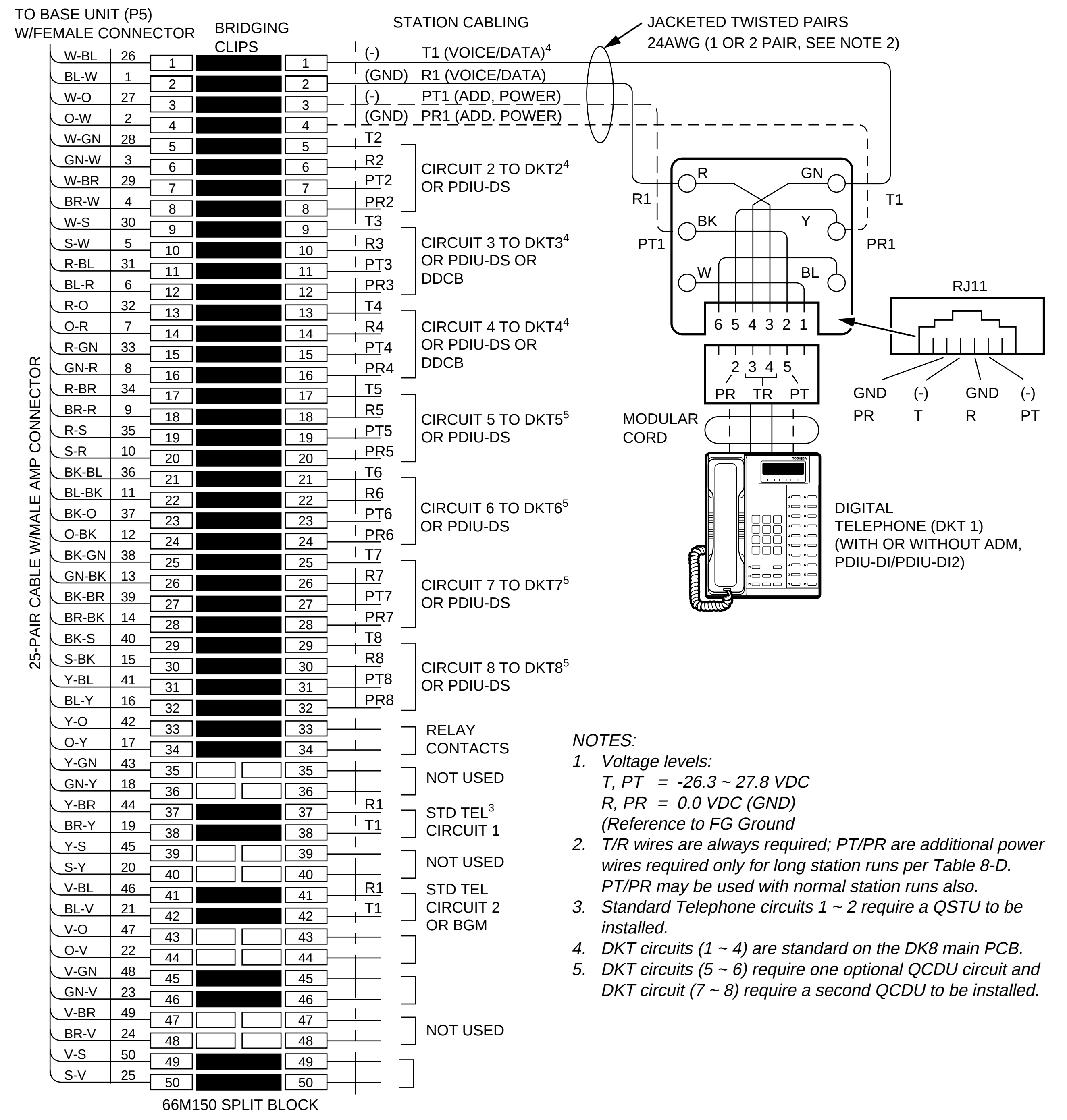
2. Curtis Mfg. Co. Inc; Jaffrey, New Hampshire 03452
- *Secondary protector: Model Diamond Chip. For indoor use on the protected side of the telephone circuit only.*

3. Oneac Corp; Libertyville, Illinois 60048
- *Secondary protector: Model OnLine 614+ and OnLine DG/S. For indoor use on the protected side of primary telephone protector only.*

4. Siemon Co.; Watertown, Connecticut 06795
- *Secondary protector for communication circuits: Model PM-2305. Intended for use with Listed Siemon 66M1 Block: Models PG-04, -25, -50, or PK-04 ground kit and Listed Type 1 enclosure. For use on the protected side of a Listed Primary Telecommunications Protector for indoor use only.*

5. Simplex Time Recorder Co.; Gardner, Massachusetts 01440
- *Isolated loop circuit protectors: Models 2081-9027 and 2081-9028. Intended for use between data communication equipment or signal lines of building system equipment.*

Install and test the secondary protectors per the installation instructions of the applicable manufacturer.



NOTES:

1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to FG Ground
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs per Table 8-D. PT/PR may be used with normal station runs also.*
3. *Standard Telephone circuits 1 ~ 2 require a QSTU to be installed.*
4. *DKT circuits (1 ~ 4) are standard on the DK8 main PCB.*
5. *DKT circuits (5 ~ 6) require one optional QCDU circuit and DKT circuit (7 ~ 8) require a second QCDU to be installed.*

FIGURE 8-2
DK8 MDF WIRING TO KSU AMPHENOL STATION AND RELAY CONNECTIONS

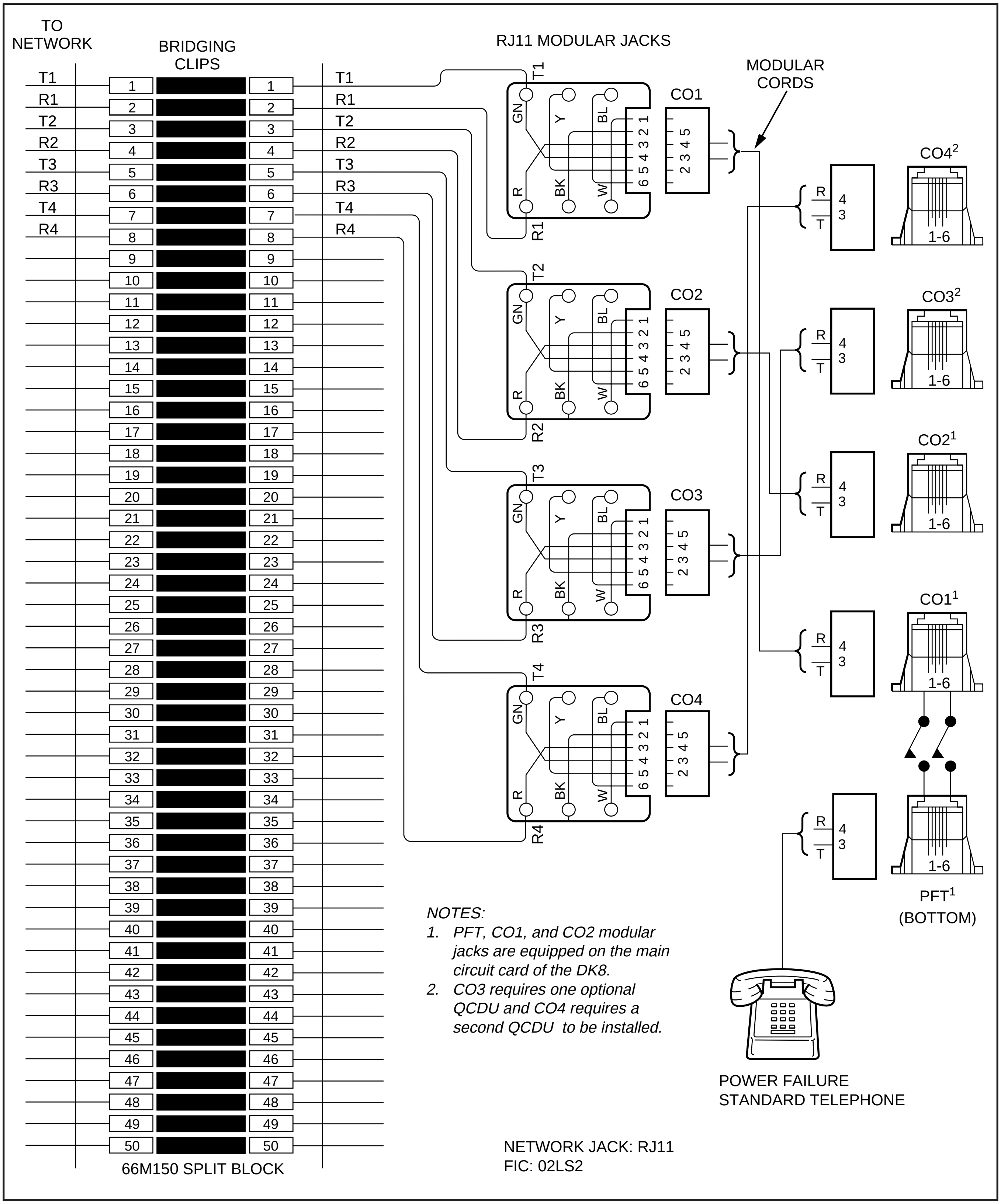
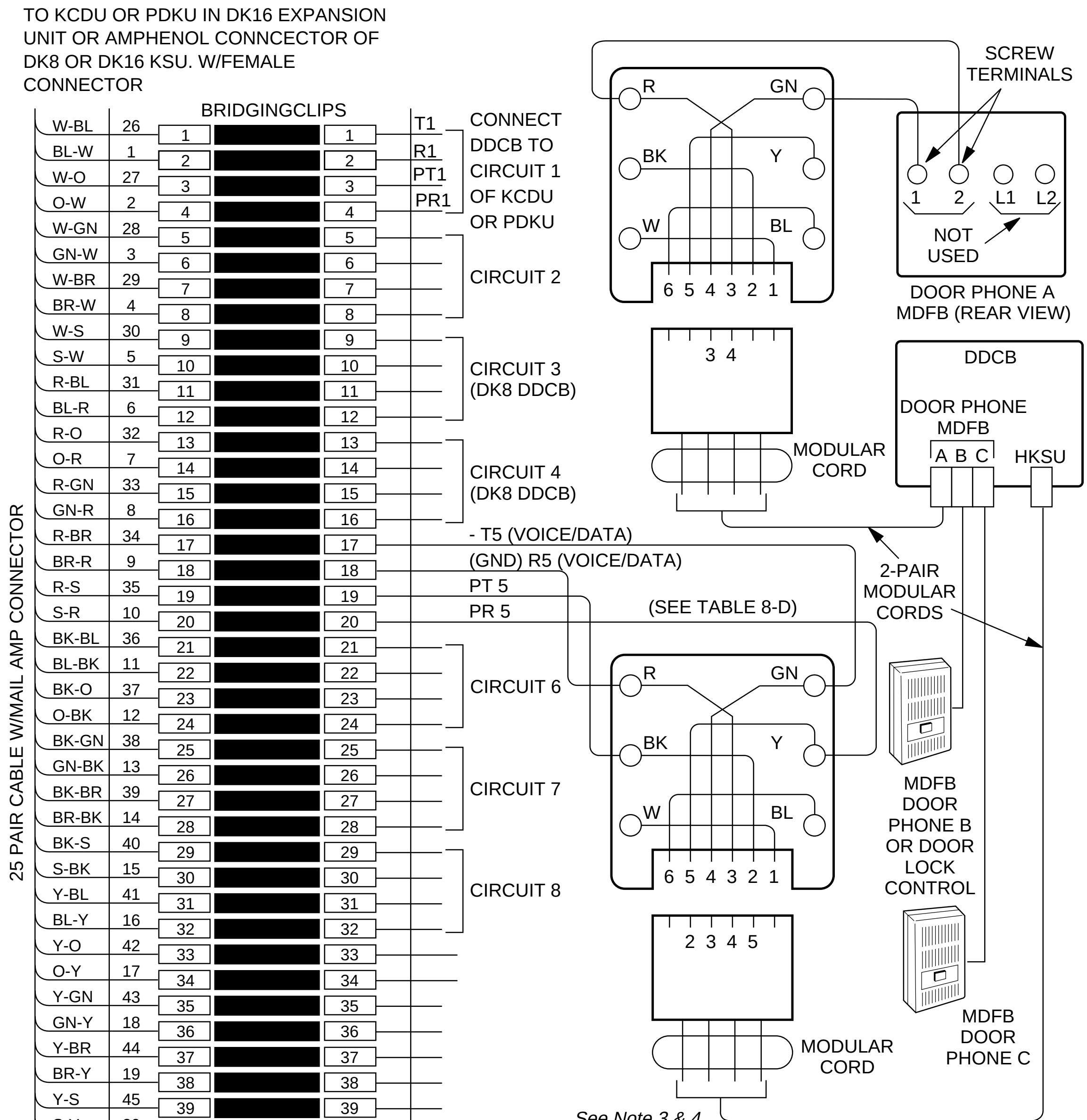


FIGURE 8-3
DK8 MDF WIRING TO CO LINES (KSU AND QCDU)



MDFB (DOOR PHONE) STATION NUMBERS				
DK8 PORT #	DK16 PORT #	A	B	C
02	4	551	552	553
03	12	554	555	556

NOTES:
1. *This figure shows DDCB connected to CKT5 of Base Unit*
2. *DDCB "B" output options:*
   SW1: Always in DOOR position.
   SW2: DOOR position; "B" connects to door phone.
   LOCK position; "B" connects to door lock.
3. *DDCB may be connected to DK8 circuit 3 (Port 02) and/or circuit 4 (Port 03)*
4. *DDCB may be connected to circuit 5, Port 4, of DK16 Base Unit or circuit 1 (Port 12) of KCDU or PDKU of DK16 Expansion Unit.*
5. *See Table 8-D for cable lengths.*

FIGURE 8-4
DK8/DK16 MDF WIRING DDCB AND DOOR LOCK CONTROL

MDF BLOCK NO. ________ KSTU/QSTU

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	STANDARD TELEPHONE/ DEVICE LOCATION
Y-BR	T	1			
BR-Y	R				
Y-S	NOT USED				
S-Y	NOT USED				
V-BL	T	2[3]			
BL-V	R				
V-O	NOT USED				
O-V	NOT USED				
V-GN	T	3[1]			
GN-V	R				
V-BR	NOT USED				
BR-V	NOT USED				
V-S	T	4[1,2]			
S-V	R				
	NOT USED				
	NOT USED				

NOTE:
1. *Circuit 3 and 4 are available on DK16 KSTU only.*
2. *Circuit 4 can support a Background Music (BGM) source, KSTU or PSTU, DK16 only.*
3. *Circuit 2 can support a Background Music (BGM) source, QSTU Port 19, DK8 only.*

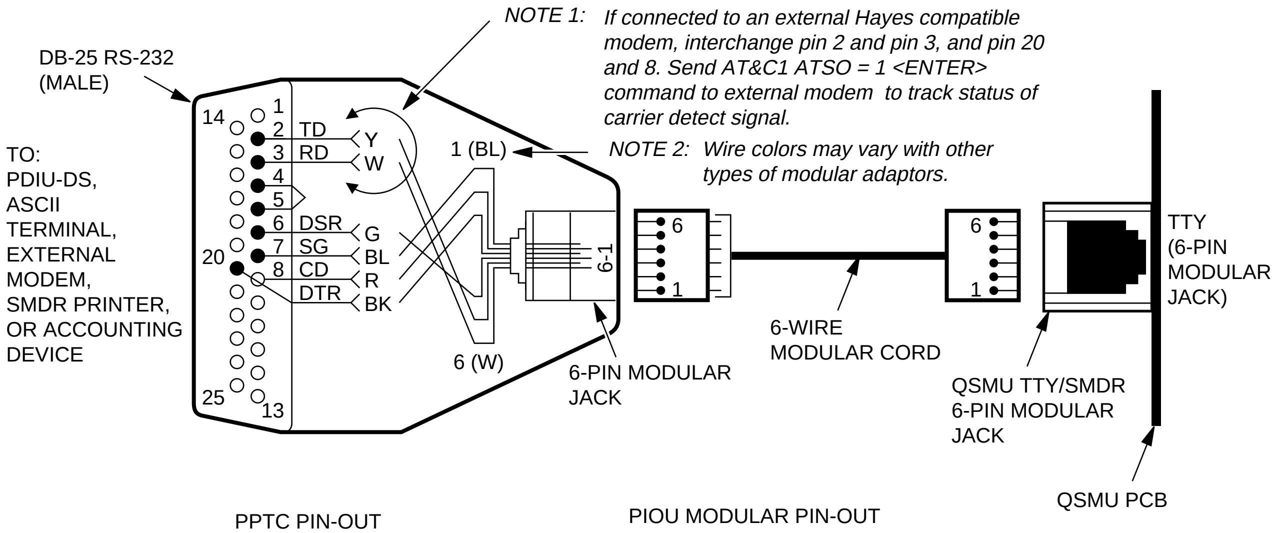
FIGURE 8-5
DK8 QSTU/DK16 KSTU STATION/MDF CROSS CONNECT RECORD

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CO LINE CROSS-CONNECT RECORD

MDF PAIR NUMBERS RJ11C/RJ14C		CO LINE NUMBER	BASE UNIT (KCDU/PCOU)
	RJ11C	1	DK8 KSU DK16 BASE UNIT, FIXED SLOT 02
	RJ11C	2	
	RJ11C	3	
	RJ11C	4	
	RJ14C	5	KCDU/PCOU SLOT 04, 05 (DK16 ONLY)
		6	
	RJ14C	7	
		8	

FIGURE 8-6
DK8 AND DK16 CO LINE RECORD



PPTC PIN-OUT

LEAD NAME	TD	RD	JUMPER	DSR	SG	CD	DTR
DB25 PINS	2	3	4-5	6	7	8	20
MODULAR PINS	5	6	N/A	4	1	2	3
WIRE COLOR	Y	W	BR	G	BL	BK	R

NOTE: QSMU TTY/SMDR PROGRAM OPTION:

PROGRAM 10-3	
LED04 ON	TTY
LED04 OFF	SMDR

PIOU MODULAR PIN-OUT

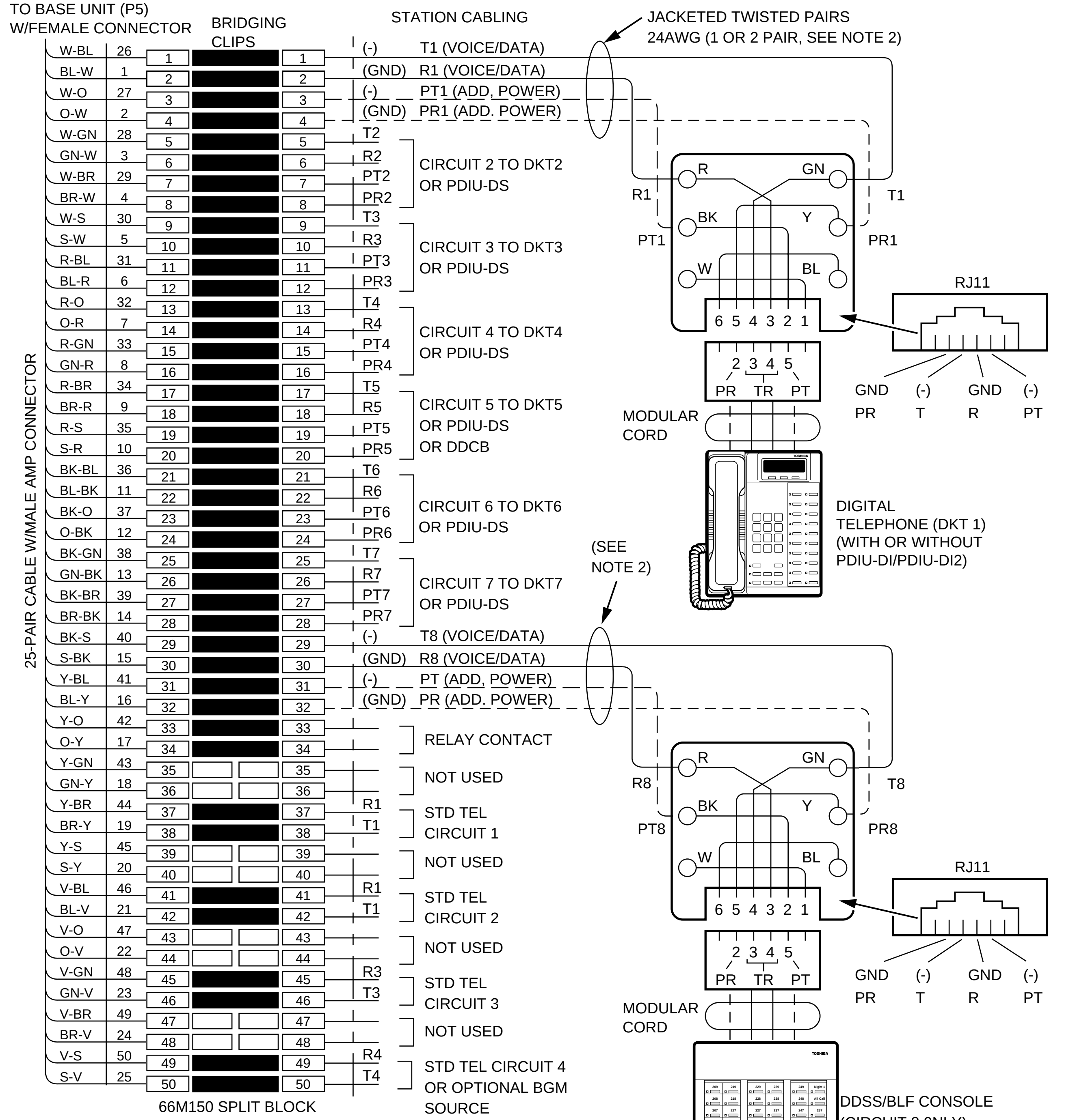
PIN NO.	TTY	SMDR
1	TYRD	SMRD
2	TYTD	SMTD
3	TYDSR	SMDSR
4	TYDTR	SMDTR
5	TYCD	SMCD
6	TYSG	SMSG

COMMUNICATION PARAMETERS:

OPTION	DATA BITS	STOP BITS	PARITY
TTY	7	1	EVEN
SMDR	8	1	NONE

TTY/SMDR SPEED: 1200 BPS

FIGURE 8-7
DK8 QSMU TTY/SMDR WIRING



NOTES:

1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to FG ground)
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs per Table 8-D. PT/PR may be used with normal station runs also.*
3. *Standard Telephone circuits 1 ~ 4 require a KSTU in the base unit.*

FIGURE 8-8
DK16 MDF WIRING/BASE UNIT P5 AMPHENOL STATION AND RELAY CONNECTIONS

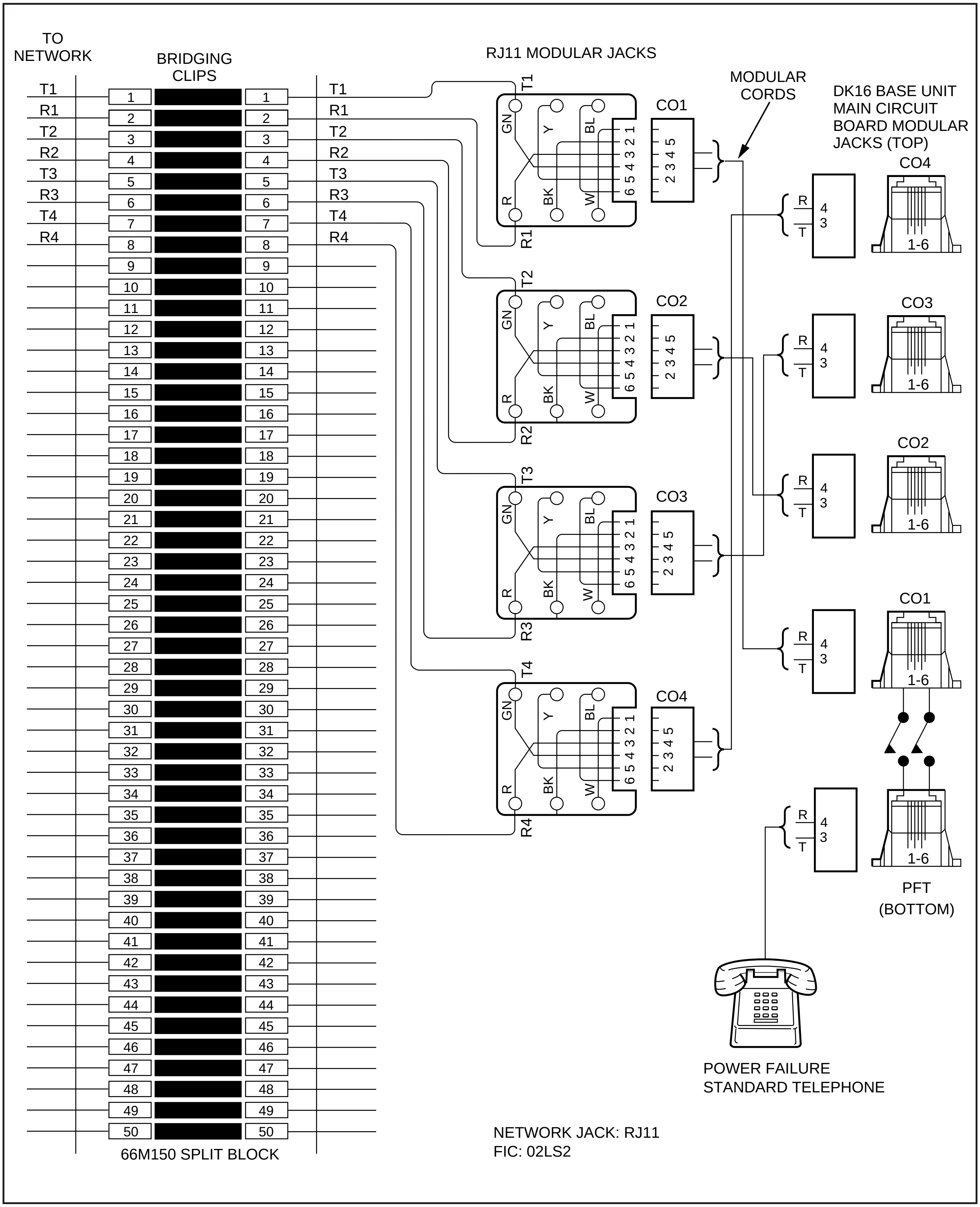
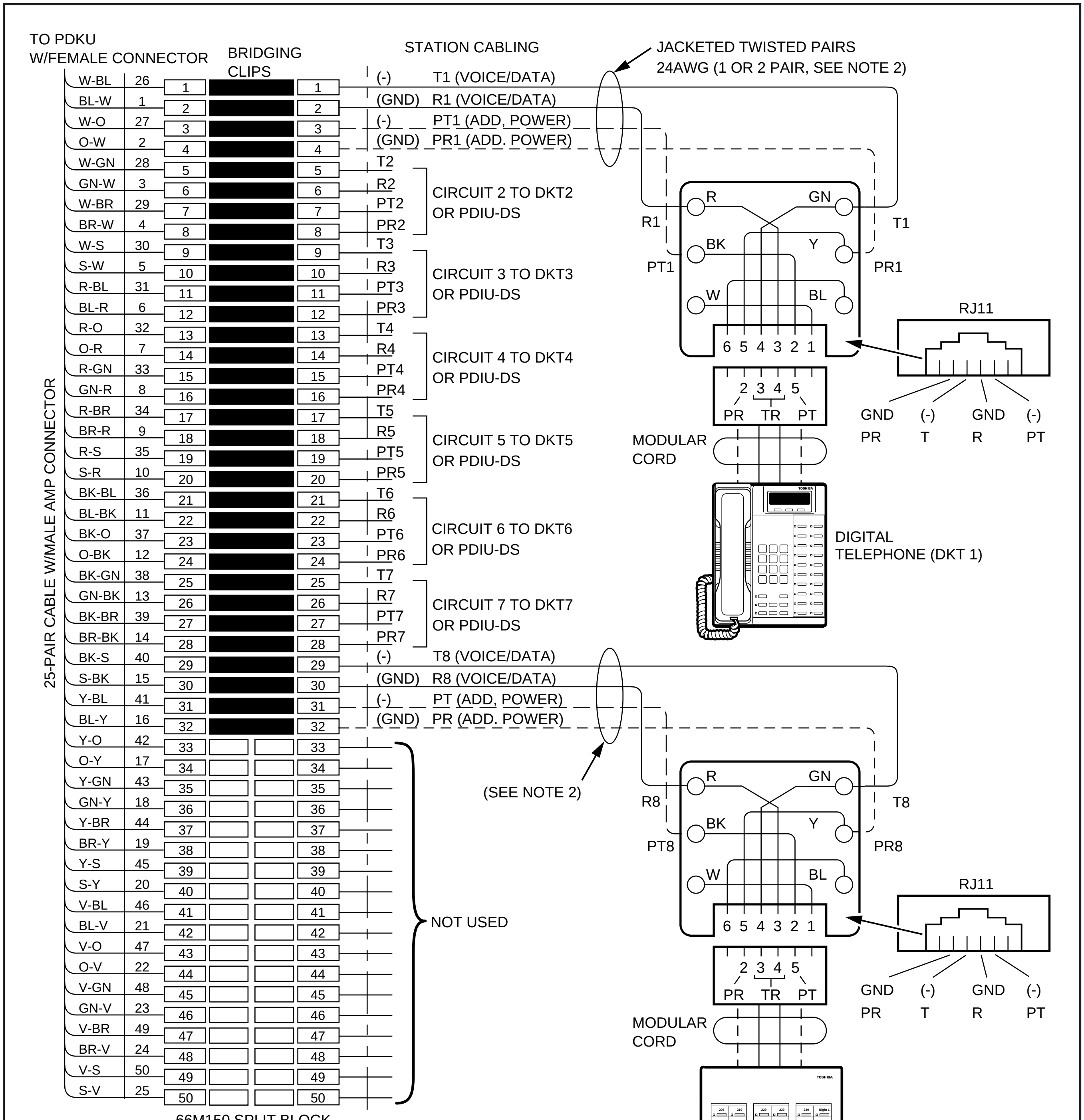


FIGURE 8-9
DK16 MDF WIRING/CO LINES TO BASE UNIT

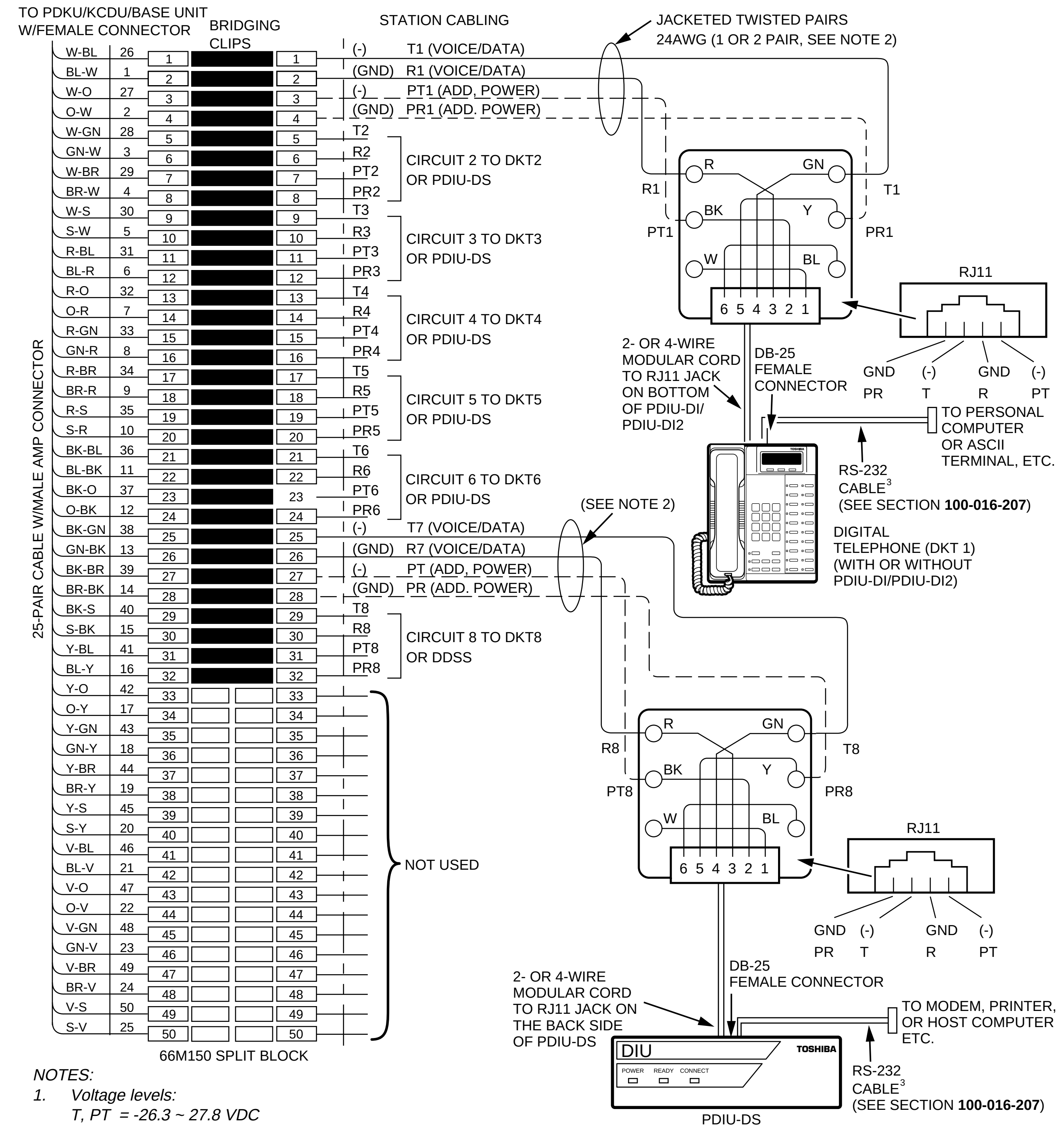


NOTES:

1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to FG ground)
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs per Table 8-D. PT/PR may be used with normal station runs also.*

FIGURE 8-10
DK16 MDF WIRING FOR DIGITAL TELEPHONES (DKTS) AND DIGITAL DSS CONSOLE (DDSS) TO PDKU

H



NOTES:

1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to SG ground)
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs or when operating on reserve power per Table 8-D. PT/PR may be used with normal station runs also.*
   RS-232 cable length is max 50 ft with 24 AWG wire.
3. *DIUs can be connected to circuits 1 ~ 7 with PDKU1; all Base Unit, KCDU, and PDKU2 digital circuits support DIUs.*
4. *Expansion Unit slots 04 and 05 only can support DIU.*
5. *KCDU provides circuits 1 ~ 4 only.*

FIGURE 8-11
DK16 MDF WIRING FOR DIGITAL TELEPHONES (DKTS) WITH PDIU-DI/PDIU-DI2 AND PDIU-DS TO PDKU, KCDU, OR BASE UNIT

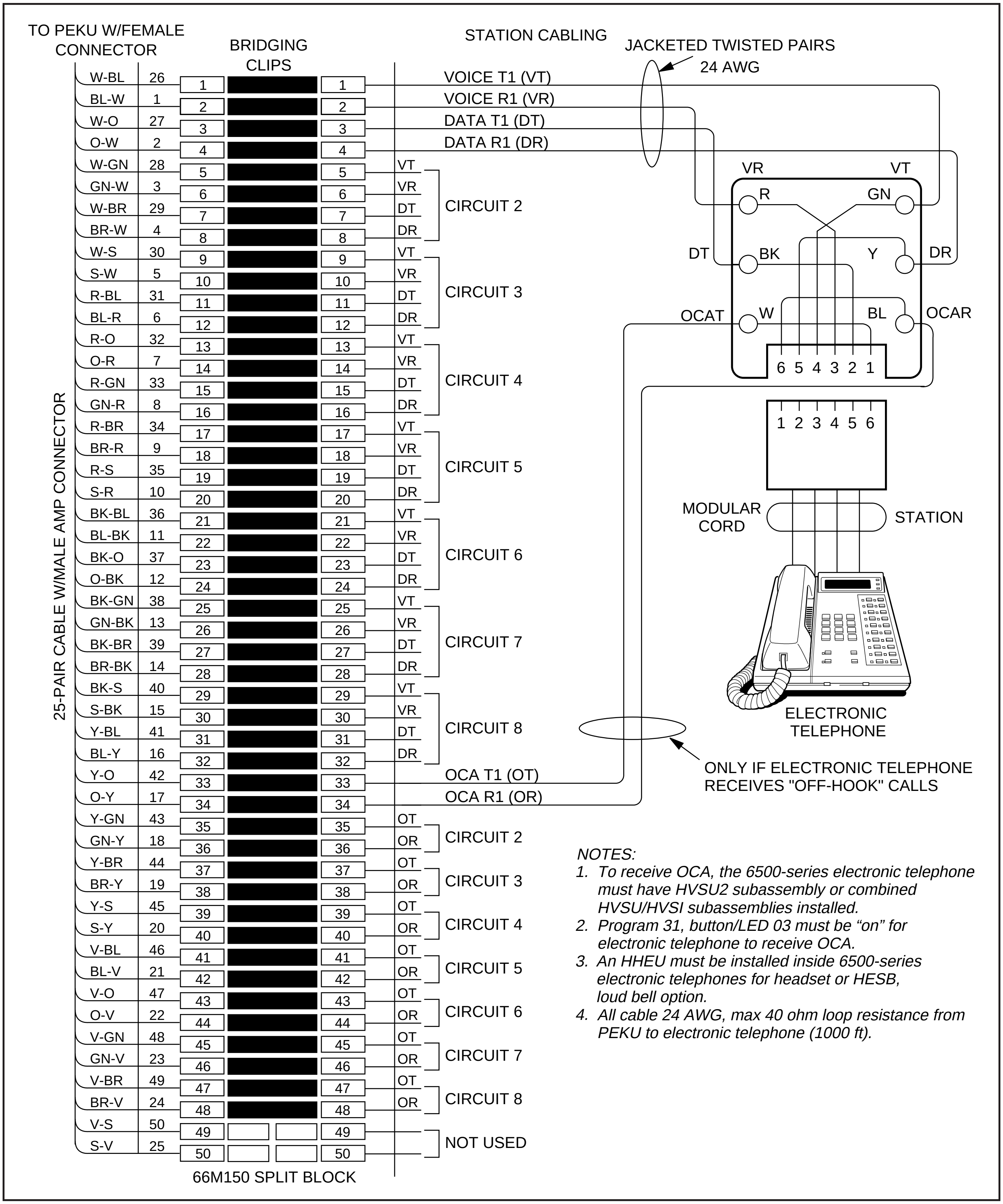
MDF BLOCK NO. ________ SLOT NO. ________

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	DIGITAL TELEPHONE/ DEVICE LOCATION
W-Bl	T	1			6
Bl-W	R				
W-O	PWR T				
O-W	PWR R				
W-G	T	2			
G-W	R				
W-Br	PWR T				
Br-W	PWR R				
W-S	T	3			7
S-W	R				
R- Bl	PWR T				
Bl-R	PWR R				
R-O	T	4			7
O-R	R				
R-G	PWR T				
G-R	PWR R				
R-Br	T	5			6
Br-R	R				
R-S	PWR T				
S-R	PWR R				
Bk-Bl	T	6			
Bl-Bk	R				
Bk-O	PWR T				
O-Bk	PWR R				
Bk-G	T	7			
G-Bk	R				
Bk-Br	PWR T				
Br-Bk	PWR R				
Bk-S	T	8			
S-Bk	R				
Y-Bl	PWR T				
Bl-Y	PWR R				

NOTES:

1. *Indicate if PDIU-DS, digital telephone (with or without PDIU-DI/PDIU-DI2 or ADM) or DDSS console (number 1 or 2) is connected.*
2. *PDIU-DS and PDIU-DI/PDIU-DI2 can be connected to circuits 1 ~ 7 only on PDKU1; all Base Unit, KCDU, and PDKU2 digital circuits support DIUs.*
3. *Expansion Unit slots 04 and 05 only can support DIUs.*
4. *For KCDU, only ckt number 1 thru 4 apply.*
5. *Make copies as necessary.*
6. *PDKU and KCDU Circuit 1 can support DDCB. Base Unit Circuit 5 can support DDCB.*
7. *DK8 circuit 3 and or circuit 4 can support DDCB.*

FIGURE 8-12
DK8 OR DK16 PDKU, KCDU, DK8 KSU OR DK16 BASE KSU DIGITAL STATION/MDF CROSS CONNECT RECORD



NOTES:

1. *To receive OCA, the 6500-series electronic telephone must have HVSU2 subassembly or combined HVSU/HVSI subassemblies installed.*
2. *Program 31, button/LED 03 must be “on” for electronic telephone to receive OCA.*
3. *An HHEU must be installed inside 6500-series electronic telephones for headset or HESB, loud bell option.*
4. *All cable 24 AWG, max 40 ohm loop resistance from PEKU to electronic telephone (1000 ft).*

FIGURE 8-13
DK16 MDF WIRING/ELECTRONIC TELEPHONE TO PEKU

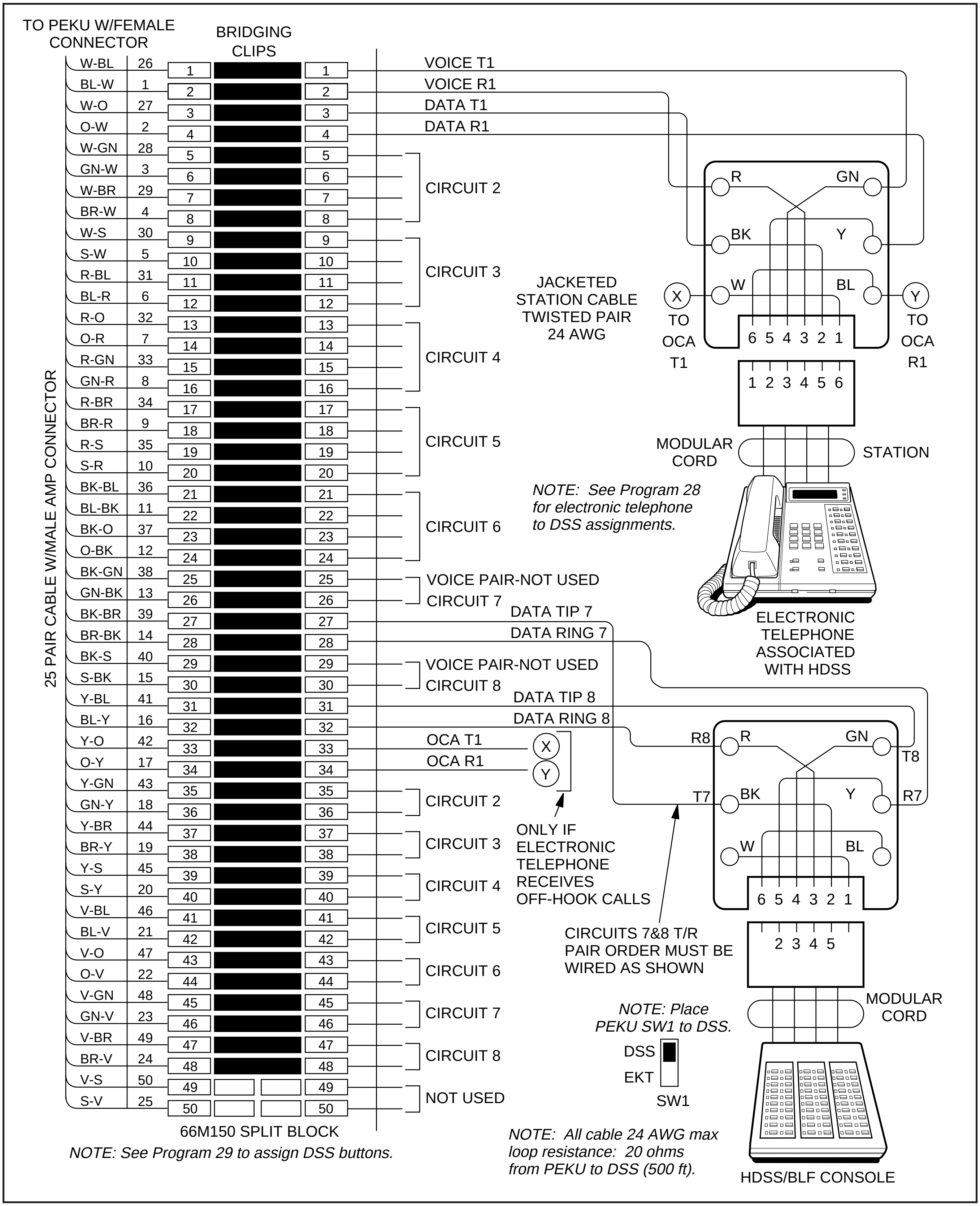


FIGURE 8-14
DK16 MDF WIRING/HDSS CONSOLE AND ASSOCIATED ELECTRONIC TELEPHONE WIRING TO PEKU

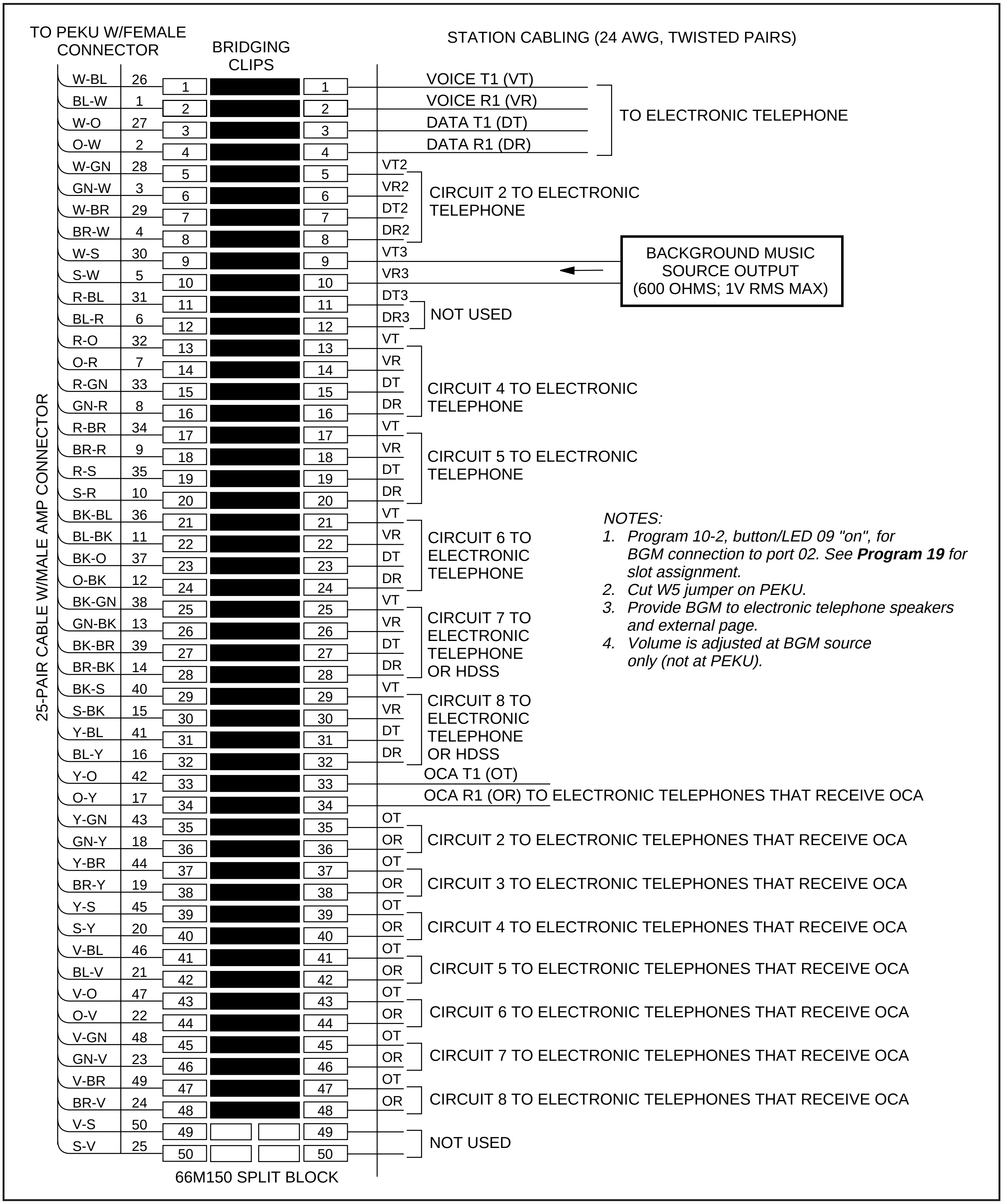


FIGURE 8-15
DK16 PEKU BACKGROUND MUSIC CONNECTION

H

MDF BLOCK NO. ____________ SLOT NO. ____________

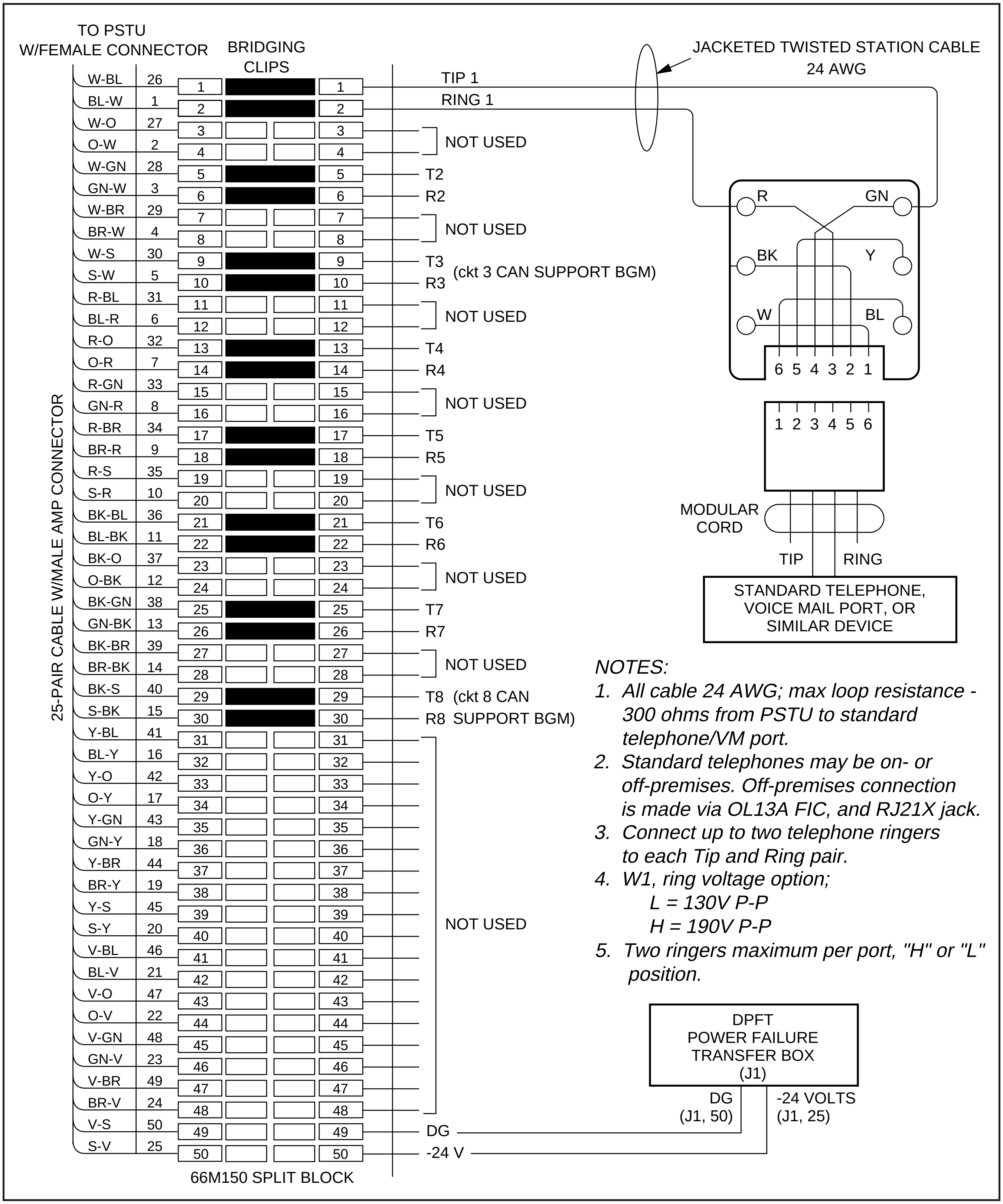
COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	ELECTRONIC TELEPHONE/ DEVICE LOCATION
W-Bl	VT	1			
Bl-W	VR				
W-O	DT				
O-W	DR				
W-G	VT	2			
G-W	VR				
W-Br	DT				
Br-W	DR				
W-S	VT	3			1
S-W	VR				
R- Bl	DT				
Bl-R	DR				
R-O	VT	4			
O-R	VR				
R-G	DT				
G-R	DR				
R-Br	VT	5			
Br-R	VR				
R-S	DT				
S-R	DR				
Bk-Bl	VT	6			
Bl-Bk	VR				
Bk-O	DT				
O-Bk	DR				
Bk-G	VT	7			2
G-Bk	VR				
Bk-Br	DT				
Br-Bk	DR				
Bk-S	VT	8			2
S-Bk	VR				
Y-Bl	DT				
Bl-Y	DR				

NOTES:

1. *Indicate if BGM or electronic telephone is connected (see* ***Program 10-2*** *and* ***19****); BGM connects to VT and VR, circuit 3 only (DT and DR not used).*
2. *Indicate if electronic telephone or HDSS console.*
3. *OCA wiring not shown, see MDF-to-electronic telephone wiring.*

FIGURE 8-16
DK16 PEKU STATION/MDF CROSS CONNECT RECORD

H



NOTES:

1. *All cable 24 AWG; max loop resistance - 300 ohms from PSTU to standard telephone/VM port.*
2. *Standard telephones may be on- or off-premises. Off-premises connection is made via OL13A FIC, and RJ21X jack.*
3. *Connect up to two telephone ringers to each Tip and Ring pair.*
4. *W1, ring voltage option;*
   L = 130V P-P
   H = 190V P-P
5. *Two ringers maximum per port, "H" or "L" position.*

FIGURE 8-17
DK16 MDF WIRING/STANDARD TELEPHONE, VOICE MAIL TO PSTU

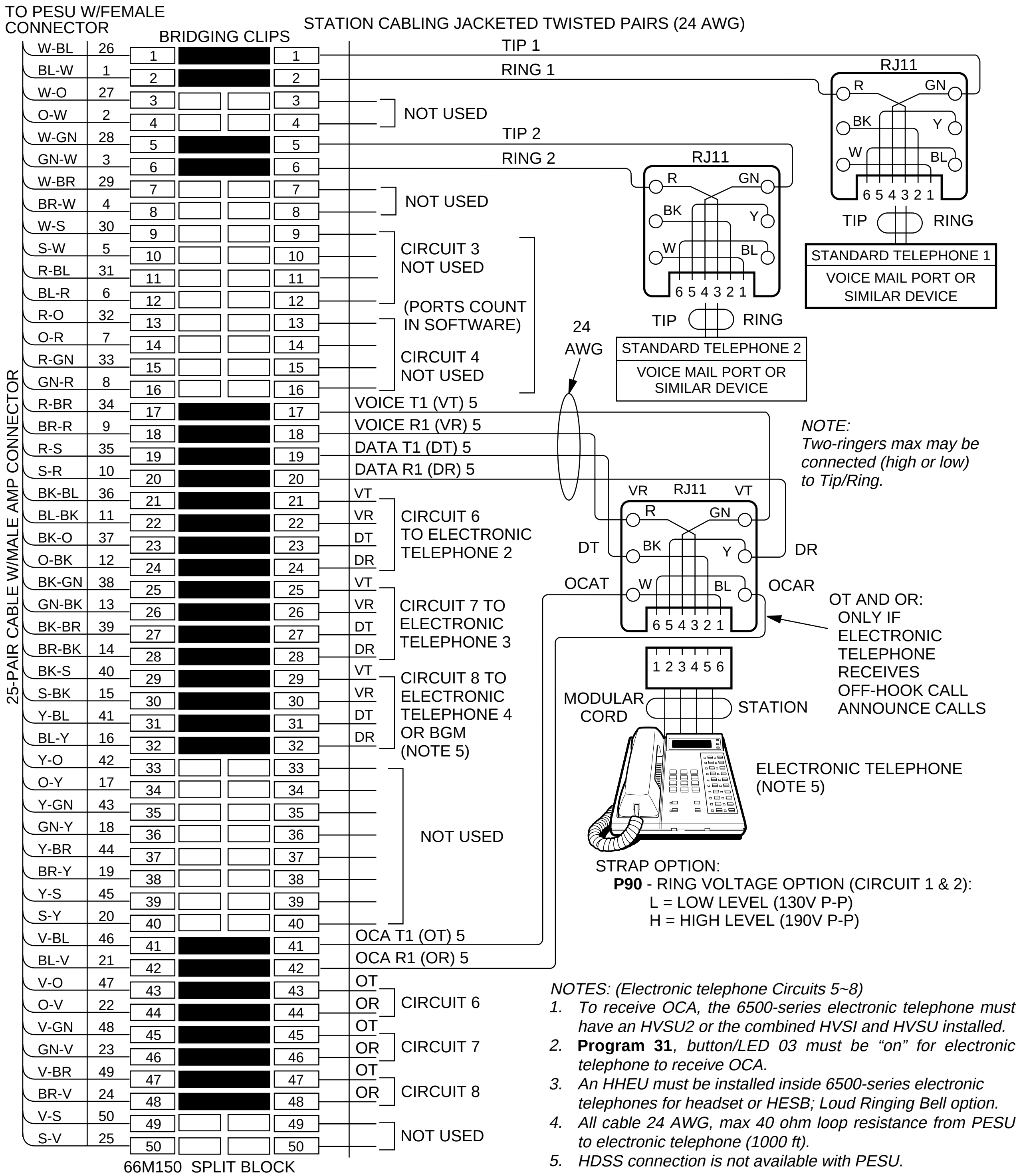
H

MDF BLOCK NO. ____________ DKSU SLOT NO. ____________

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	STANDARD TELEPHONE/ DEVICE LOCATION
W-Bl	T	1			
Bl-W	R				
W-O	NOT USED				
O-W	NOT USED				
W-G	T	2			
G-W	R				
W-Br	NOT USED				
Br-W	NOT USED				
W-S	T	3			2
S-W	R				
R- Bl	NOT USED				
Bl-R	NOT USED				
R-O	T	4			
O-R	R				
R-G	NOT USED				
G-R	NOT USED				
R-Br	T	5			
Br-R	R				
R-S	NOT USED				
S-R	NOT USED				
Bk-Bl	T	6			
Bl-Bk	R				
Bk-O	NOT USED				
O-Bk	NOT USED				
Bk-G	T	7			
G-Bk	R				
Bk-Br	NOT USED				
Br-Bk	NOT USED				
Bk-S	T	8			2
S-Bk	R				
Y-Bl	NOT USED				
Bl-Y	NOT USED				

NOTES:
1. Indicate if standard telephone, voice mail port, etc.
2. Circuit 3 or 8 can support a Background Music (BGM) source.

FIGURE 8-18
DK16 PSTU STATION/MDF CROSS CONNECT RECORD



STRAP OPTION:
P90 - RING VOLTAGE OPTION (CIRCUIT 1 & 2):
L = LOW LEVEL (130V P-P)
H = HIGH LEVEL (190V P-P)

NOTES: (Electronic telephone Circuits 5~8)

1. *To receive OCA, the 6500-series electronic telephone must have an HVSU2 or the combined HVSI and HVSU installed.*
2. ***Program 31**, button/LED 03 must be "on" for electronic telephone to receive OCA.*
3. *An HHEU must be installed inside 6500-series electronic telephones for headset or HESB; Loud Ringing Bell option.*
4. *All cable 24 AWG, max 40 ohm loop resistance from PESU to electronic telephone (1000 ft).*
5. *HDSS connection is not available with PESU.*

NOTES: (Standard telephone circuits 1 & 2)

1. *All cable 24 AWG; max loop resistance - 300 ohms from PESU to standard telephone/VM port.*
2. *Standard telephones may be on- or off-premises. Off-premises connection is made via OL13A FIC, and RJ21X jack.*
3. *Two ringers max per port.*
4. *Circuit 6 and 7 can provide interface for an external conference amplifier (Prog 10-3).*

FIGURE 8-19
DK16 PESU CIRCUIT CARD WIRING DIAGRAM

H

MDF BLOCK NO.______________

COLOR CODE	DESIGNATION	CKT NUMBER	PORT NUMBER	INTERCOM NUMBER	DEVICE/STANDARD TELEPHONE/ ELECTRONIC TELEPHONE LOCATION
W-Bl	T	1			
Bl-W	R				
W-O	NOT USED				
O-W	NOT USED				
W-G	T	2			
G-W	R				
W-Br	NOT USED				
Br-W	NOT USED				
W-S	NOT USED	3		N/A	N/A
S-W	NOT USED				
R- Bl	NOT USED				
Bl-R	NOT USED				
R-O	NOT USED	4		N/A	N/A
O-R	NOT USED				
R-G	NOT USED				
G-R	NOT USED				
R-Br	VT	5			
Br-R	VR				
R-S	DT				
S-R	DR				
Bk-Bl	VT	6			2
Bl-Bk	VR				
Bk-O	DT				
O-Bk	DR				
Bk-G	VT	7			1, 2
G-Bk	VR				
Bk-Br	DT				
Br-Bk	DR				
Bk-S	VT	8			1, 3
S-Bk	VR				
Y-Bl	DT				
Bl-Y	DR				

NOTES:

1. *HDSS is not allowed.*
2. *Indicate if external amplifier is connected.*
3. *Indicate if BGM or electronic telephone is connected; BGM connects to VT and VR, circuit 8 only (DT and DR not used).*
4. *OCA wiring not shown, see MDF-to-electronic telephone wiring.*

FIGURE 8-20
DK16 PESU STATION/MDF CROSS CONNECT RECORD

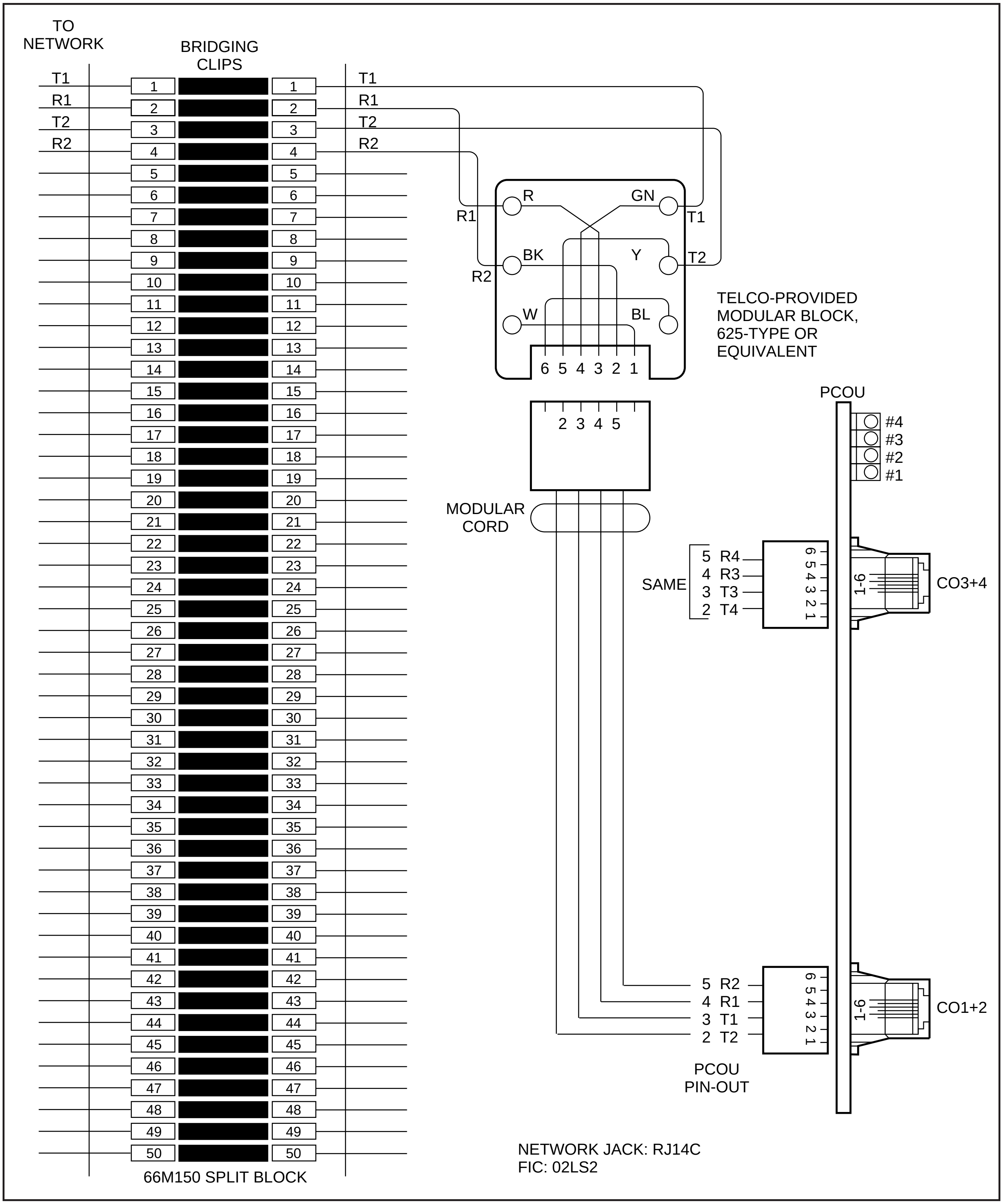
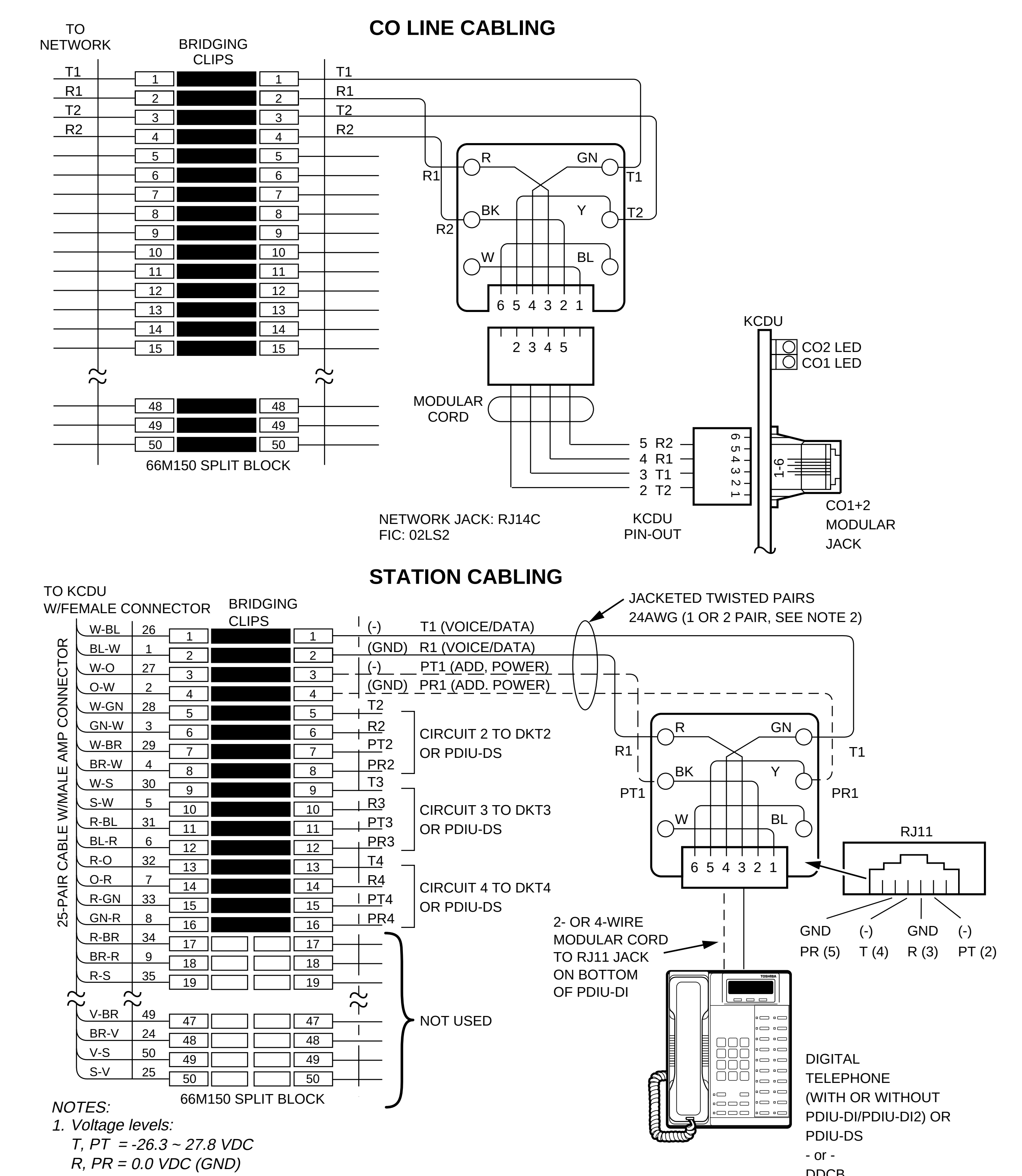


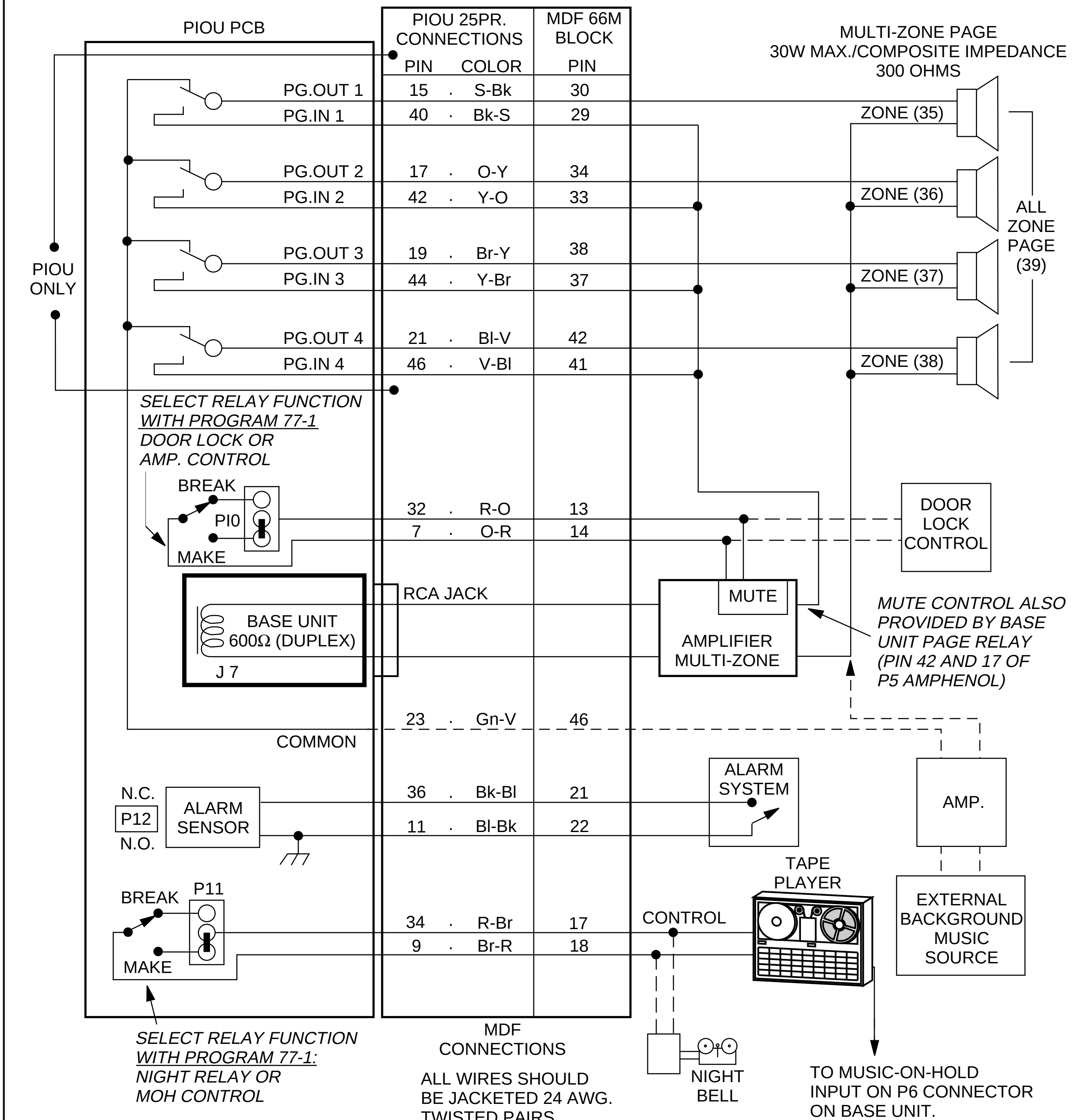
FIGURE 8-21
DK16 MDF WIRING/CO LINES TO PCOU



NOTES:

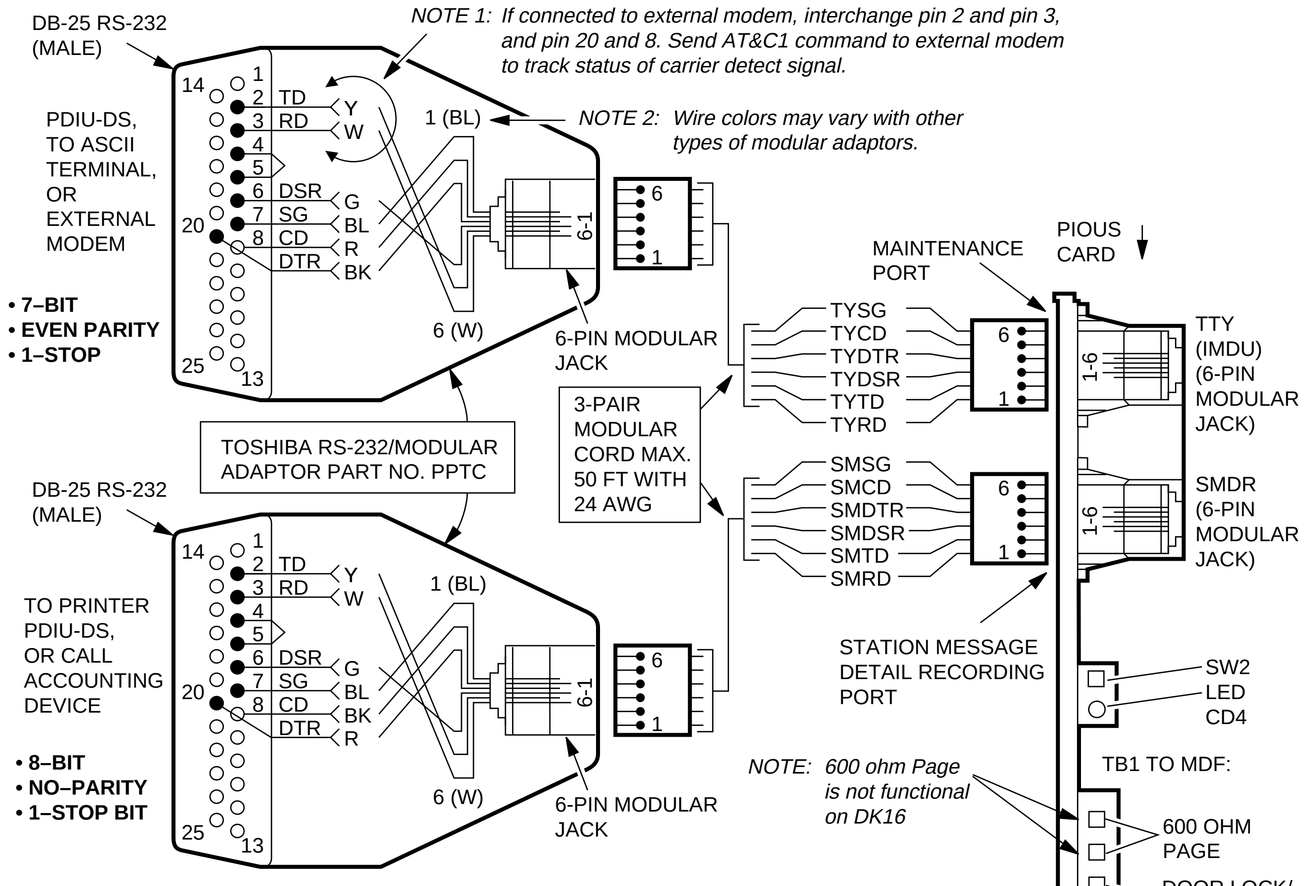
1. *Voltage levels:*
   T, PT = -26.3 ~ 27.8 VDC
   R, PR = 0.0 VDC (GND)
   (Reference to SG ground)
2. *T/R wires are always required; PT/PR are additional power wires required only for long station runs or when operating on reserve power per Table 8-D. PT/PR may be used with normal station runs also.*
3. *ADMs and/or DIUs can be connected to circuits 1 ~ 4, DDCB can be connected to Circuit 1.*

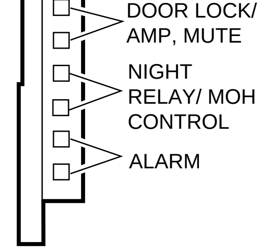
FIGURE 8-22
DK16 MDF WIRING/CO LINES AND DIGITAL TELEPHONES TO KCDU



NOTE:
This figure shows PIOU relay callouts. See Chapter 5 for PIOUS relay callouts.

FIGURE 8-23
DK16 MDF WIRING/PIOU PERIPHERALS (25-PAIR)





NOTE 3: PIOUS option settings:
SW1 – Sets the SMDR baud rate to be 300 or 1200 BPS.
SW2 – Sets the PIOU programming speed to be 300 or 1200 BPS (for IMDU or TTY jack).
LED CO4 "On" = 300 BPS/SW2 set "In".
LED CO4 "Off" = 1200 BPS/SW2 set "Out".
SW3 – Sets the PIOUS to operate with the IMDU or an external device connected to the TTY modular jack.

MODEM	– *For IMDU operation (7, even, 1)*
TTY	– *For ASCII terminal (8, none, 1) or external modem (8, none, 1).*

W4 – Sets the IMDU and TTY jack for bell or CCITT specification.
BELL - "W4 not installed".

NOTE 4: PDIU-DS jumpers should be set to the B-C position when connected to the PIOUS TTY or SMDR port.

PIOU MODULAR PIN-OUT

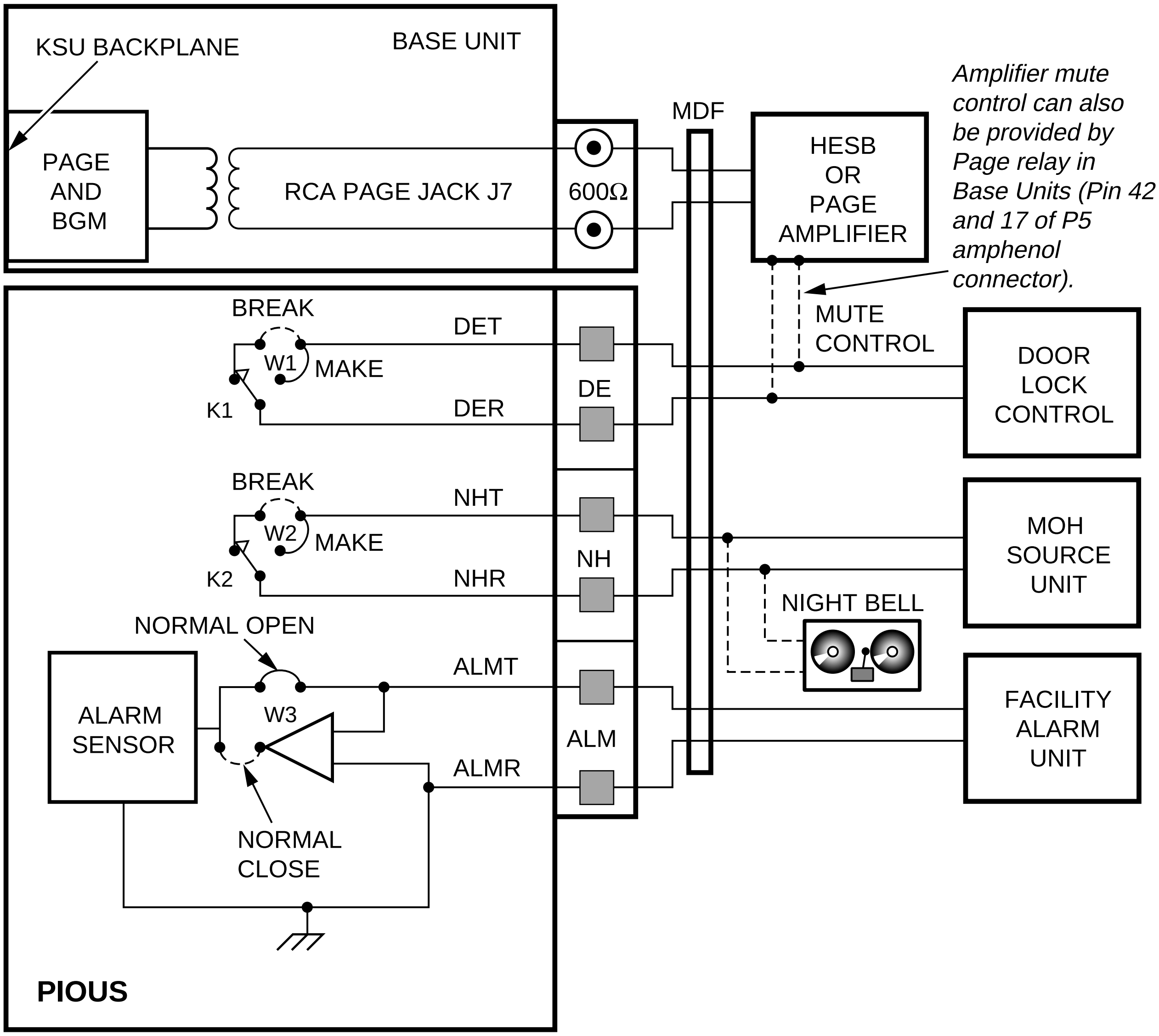
PIN NO.	TTY	SMDR
1	TYRD	SMRD
2	TYTD	SMTD
3	TYDSR	SMDSR
4	TYDTR	SMDTR
5	TYCD	SMCD
6	TYSG	SMSG

PPTC PIN-OUT

LEAD NAME	TD	RD	JUMPER	DSR	SG	CD	DTR
DB25 PINS	2	3	4-5	6	7	8	20
MODULAR PINS	5	6	N/A	4	1	2	3
WIRE COLOR	Y	W	BR	G	BL	BK	R

FIGURE 8-24
DK16 PIOUS/TTY AND SMDR WIRING

H

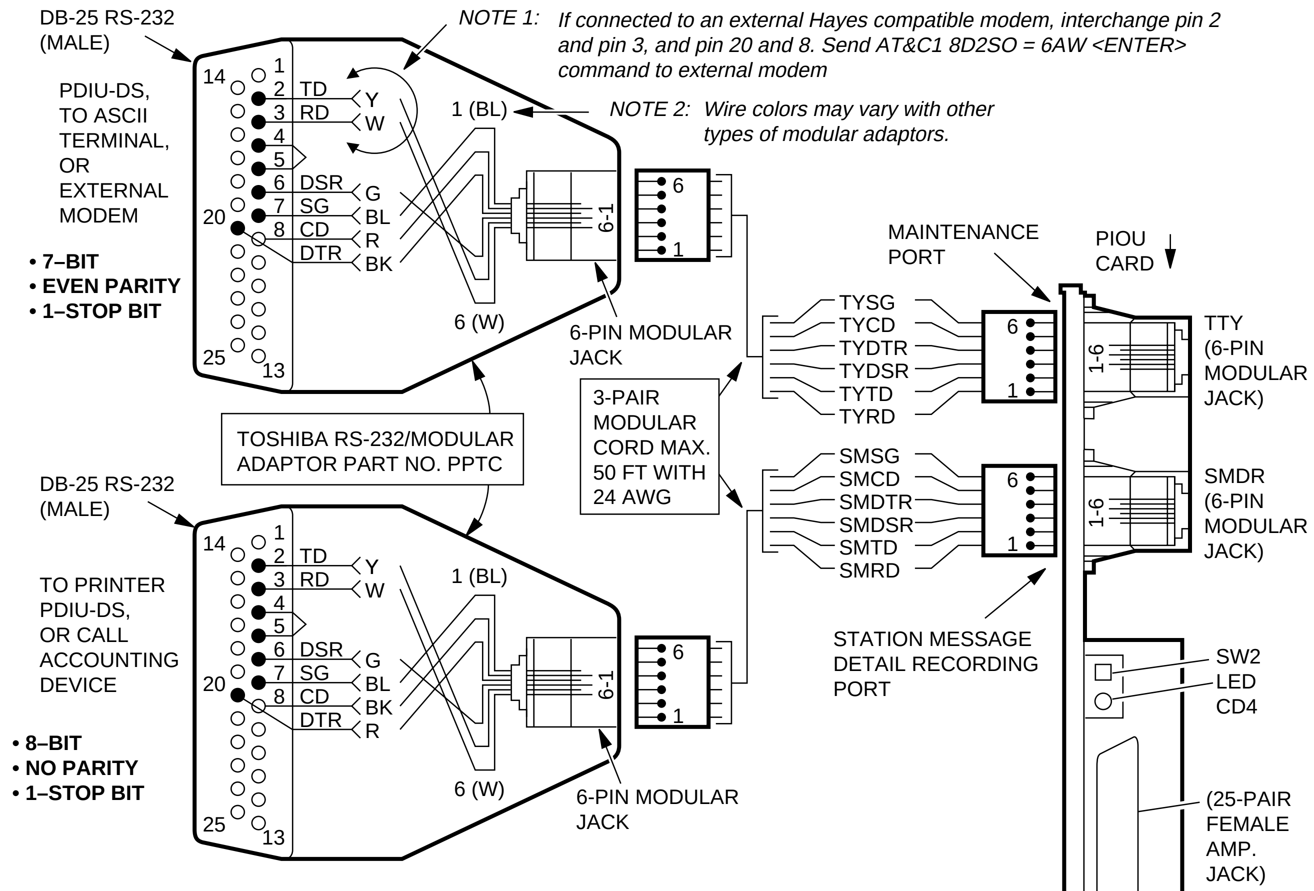


- *All wiring connections must be 24 AWG twisted pairs.*
- *Dotted lines show optional connections; only one optional connection is allowed.*

RELAY OPTIONS:

- K1 (DE): DOOR LOCK OR AMP MUTE CONTROL; PROGRAM 77-1, LED 07
- K2 (NH): NIGHT RELAY OR MUSIC-ON-HOLD CONTROL; PROGRAM 77-1, LED 05
- K1 & K2: 24 VDC, 1 AMP MAXIMUM

FIGURE 8-25
DK16 PIOUS PAGE/RELAY/ALARM CONNECTIONS



NOTE 3: PIOU option settings:
SW1 – Sets the SMDR baud rate to be 300 or 1200 BPS.
SW2 – Sets the PIOU programming speed to be 300 or 1200 BPS (for IMDU or TTY jack). LED CO4 "On" = 300 BPS/SW2 set "In". LED CO4 "Off" = 1200 BPS/SW2 set "Out".
SW3 – Sets the PIOU to operate with the IMDU or an external device connected to the TTY modular jack.

MODEM	*– For IMDU operation (7, even, 1)*
TTY	*– For ASCII terminal (8, none, 1) or external modem (8, none, 1).*

P13 – Sets the IMDU and TTY jack for bell or CCITT specification.

NOTE 4: PDIU-DS jumpers should be set to the B-C position when connected t o the PIOU TTY or SMDR port.

PIOU MODULAR PIN-OUT

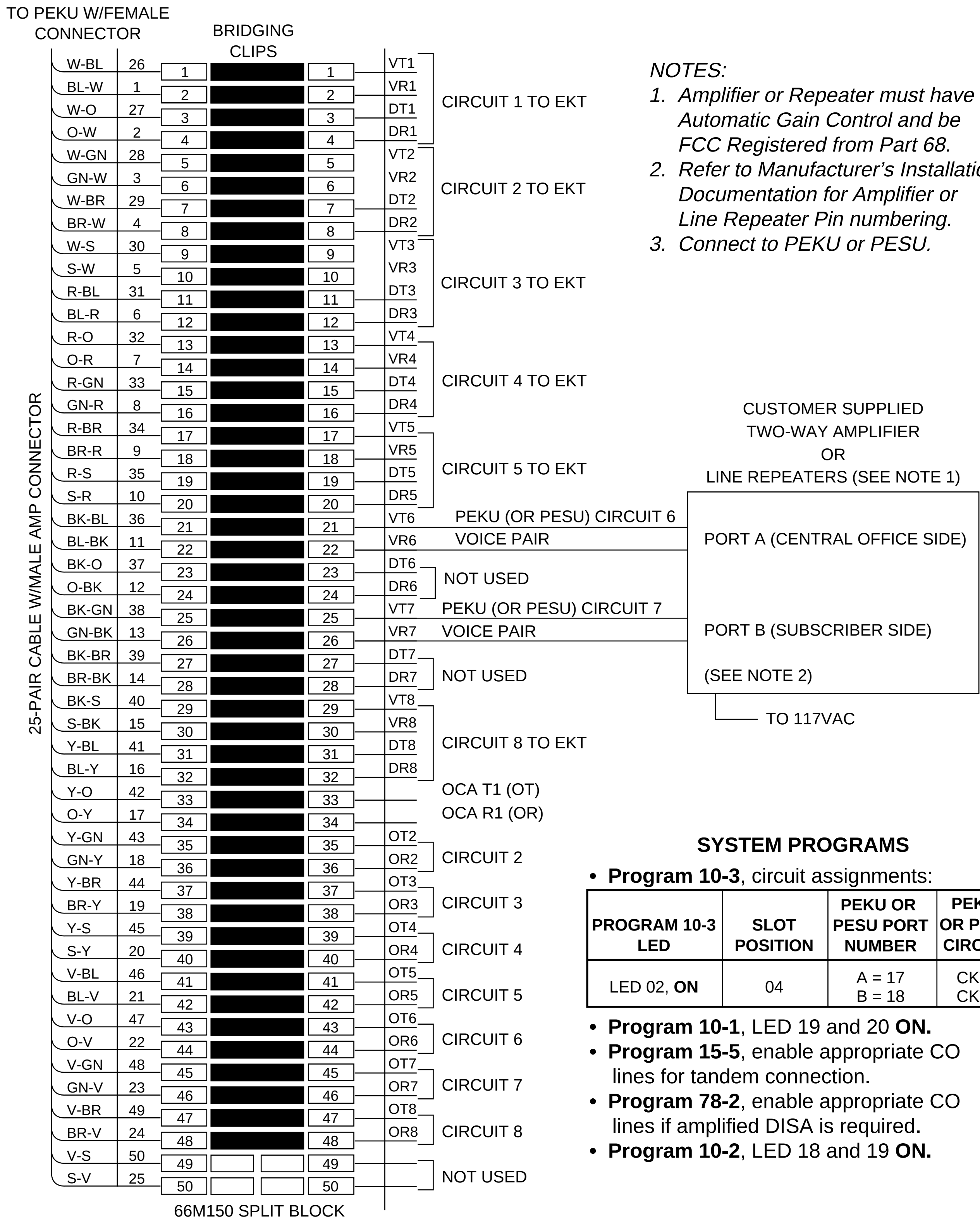
PIN NO.	TTY	SMDR
1	TYRD	SMRD
2	TYTD	SMTD
3	TYDSR	SMDSR
4	TYDTR	SMDTR
5	TYCD	SMCD
6	TYSG	SMSG

PPTC PIN-OUT

LEAD NAME	TD	RD	JUMPER	DSR	SG	CD	DTR
DB25 PINS	2	3	4-5	6	7	8	20
MODULAR PINS	5	6	N/A	4	1	2	3
WIRE COLOR	Y	W	BR	G	BL	BK	R

FIGURE 8-26
DK16 PIOU SMDR/TTY OPTIONS AND WIRING

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NOTES:

1. *Amplifier or Repeater must have Automatic Gain Control and be FCC Registered from Part 68.*
2. *Refer to Manufacturer's Installation Documentation for Amplifier or Line Repeater Pin numbering.*
3. *Connect to PEKU or PESU.*

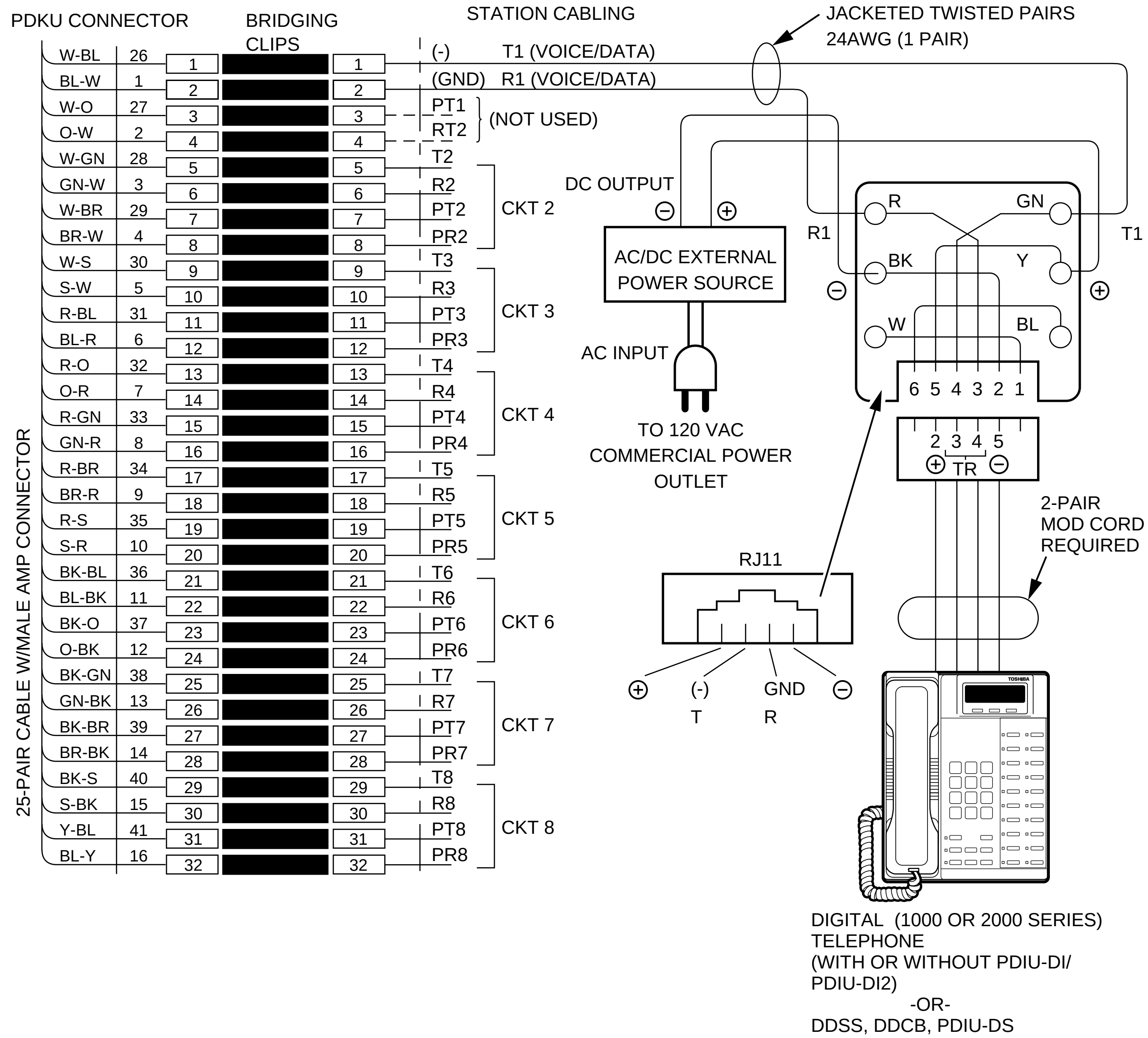
SYSTEM PROGRAMS

- **Program 10-3**, circuit assignments:

PROGRAM 10-3 LED	SLOT POSITION	PEKU OR PESU PORT NUMBER	PEKU OR PESU CIRCUIT
LED 02, **ON**	04	A = 17 B = 18	CKT6 CKT7

- **Program 10-1**, LED 19 and 20 **ON.**
- **Program 15-5**, enable appropriate CO lines for tandem connection.
- **Program 78-2**, enable appropriate CO lines if amplified DISA is required.
- **Program 10-2**, LED 18 and 19 **ON.**

FIGURE 8-27
DK16 MDF WIRING/AMPLIFIED TWO-CO LINE CONFERENCE



AC/DC EXTERNAL POWER SOURCE SPECIFICATIONS:

AC IN: **120 VDC ± 10%**
DC OUT: **24 VDC ± 10%**
160 MA (MIN.) DC CURRENT
200 MV P-P (MAX) AC RIPPLE ON DC OUTPUT

AC/DC power supplies that meet the above requirements are available from most telephone equipment supply houses.

EXTERNAL POWER STRAPS:

If the external power is installed, cut the external power straps located inside the digital telephone, DDSS, DDCB, or PDIU-DS.
See **Table 8-D** at the front of this section for external power requirements.

FIGURE 8-28
DK16 EXTERNAL POWER FOR DIGITAL TELEPHONE CONNECTION

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Strata® DK8 & DK16

FAULT FINDING PROCEDURES

H

TABLE OF CONTENTS

TABLE LIST

FIGURE LIST

H

1 GENERAL

1.01 This section describes the maintenance procedures used to diagnose faults in the STRATA DK8 and DK16 digital key telephone system. Faults are classified and then cleared by replacing the malfunctioning unit and performing operational tests in the sequences prescribed by the fault clearing flowcharts in Paragraph **9**.

2 FAULT CLASSIFICATION

2.01 A Fault Classification Flowchart is provided to ensure that fault clearing is pursued in a logical sequence (Chart No. 1).

2.02 An assumption is made in the flowcharts that the fault was discovered and reported by a digital or electronic telephone user. All faults, therefore, are classified according to the way they would appear at the digital or electronic telephone.

2.03 Faults and associated flowcharts in Table A are organized into the following categories:

TABLE A
FLOWCHARTS

Flowchart	Title
1	Fault Classification
2	Catastrophic Faults
3	Station Dial Tone Faults
4	CO Line Dial Tone Faults
5	DSS Console Faults
6	Voice Mail/(External) Auto Attendant (VM/AA) Faults
7	Station Message Detail Recording (SMDR) Faults
8	Remote Maintenance Faults

3 FAULT CLEARING PROCEDURES

3.01 Before attempting to clear any fault, ensure that it is in the system and not caused by associated external equipment, such as wiring, MOH source, etc.

IMPORTANT!
Many system features are assigned, enabled or disabled using software entries as described in **Programming Procedures.** ***It is very important to verify that the system programming is correct and functional before troubleshooting the hardware.***

3.02 Initialize the system (**Program 90**, **92**, and **03**) before testing new systems or when in DK16 cases,, changing the KFCU, Feature cartridge (if instructions specify).

3.03 Faults in the DK8 and DK16 are cleared by replacing PCBs, telephones (digital or electronic) or the power supply, as instructed in the flowcharts.

3.04 Five symbols are used in the flowcharts, which are identified in Figure 1.

3.05 The flowcharts are sequentially arranged to permit rapid fault localization within the system. *All fault clearing must begin with the Fault Classification Flowchart*, which is arranged in the correct fault locating sequence.

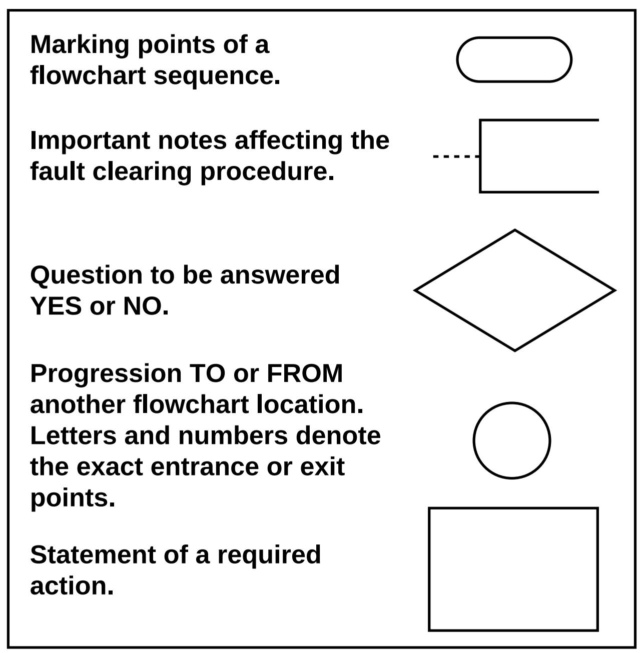


FIGURE 1
FLOWCHART SYMBOLS

3.06 The following precautions must be observed when handling PCBs:

DO NOT:

- Drop a PCB.
- Stack one PCB on top of another.
- Handle a PCB without discharging any static electricity from your person by touching the grounded cabinet.
- Touch PCB contacts with your fingers.

Important!
If the fault is not cleared by substituting a PCB, the original PCB must be reinstalled in the KSU before trying another PCB.

4 DEFECTIVE APPARATUS RETURNS

4.01 When a defective system apparatus is shipped for repair, the apparatus must be packed in a suitable container (the original box is highly recommended), as follows:

a) Anti-static containers for all other PCBs and Feature cartridge.
b) Plastic bags for digital or electronic telephones, KSU, etc.

4.02 NEVER WRITE ON THE APPARATUS ITSELF! Describe the nature of the defect on an information tag. Attach the tag to the front of the unit with string (not wire) so the tag can remain attached during the testing and repair process. Return tags are available from Toshiba America Information Systems, Inc., TSD Division.

5 FAULT IDENTIFICATION AND ELIMINATION PROCEDURES

5.01 The DK8 or DK16, KSU common control circuits or DK16 KFCU may contain a "soft" fault due to an extremely high level of static electricity. If it is found defective during the fault finding procedures, attempt to clear a soft fault prior to returning the KSU or KFCU for repair. The correct procedure for this is to perform the initialization procedure, and then re-program the system as necessary to test for the fault. If the fault returns after these procedures are performed, tag the defective KSU or KFCU and return it for repair.

6 DK8 HARDWARE FAULT ISOLATION

6.01 If a DK8 hardware fault is suspected, check the hardware using the following procedure:

1) Make sure the BATT jumper plug (SW1 on the KSU motherboard) is in the ON position to save the system's customer data base.

2) Unplug HPFB battery cable from BATT connector on QPSU8 Power Supply (see Figure 2).

3) Remove all piggy-back PCBs from the DK8 motherboard one at a time. Retest to check if the problem is cleared each time a PCB is removed. If it is found that a particular PCB is causing the problem, replace that PCB and retest (piggy-back PCBs include QSTU, QCDU, QRCU, QCNU, and QSMU).

4) Test power supply as follows (refer to Figure 2):
   a) Plug the AC power cable into an outlet.
      - The "AC" LED on the power supply should light green.
   b) Turn the power supply switch to the ON position.
      - The "DC" LED on the power supply should light green.
   c) Using the voltmeter, measure the voltages referenced to frame ground (FG) at the power supply connector CN3 pins (test points) and pin 42 of IC5 located on the motherboard (Figure 2). The voltages should fall within the ranges below. If the voltages do not fall within the range, unplug the DC power pins from power supply connector CN3 and measure +24V again at the same location; if the voltages remain unacceptable, replace the power supply (see Section 100-816-204).
      - J19 Green Wires: 0V
      - J19 Yellow Wires: +24V
         - Range: +26.3V ~ +27.8V
      - IC5, Pin 42, +5V
         - Range: +4.5V ~ +5.5V
   d) If the +24V tests within range but +5V is not with-in specification, the KSU must be replaced.

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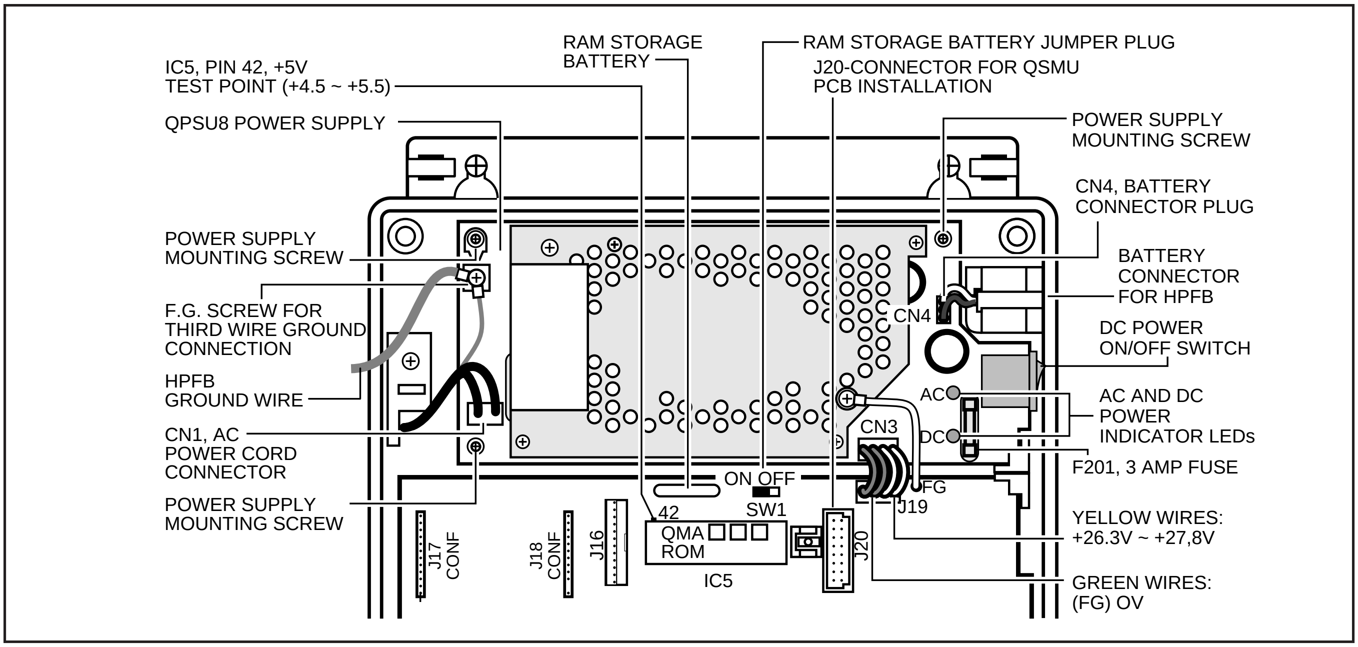


FIGURE 2
QPSU8 DC VOLTAGE TEST

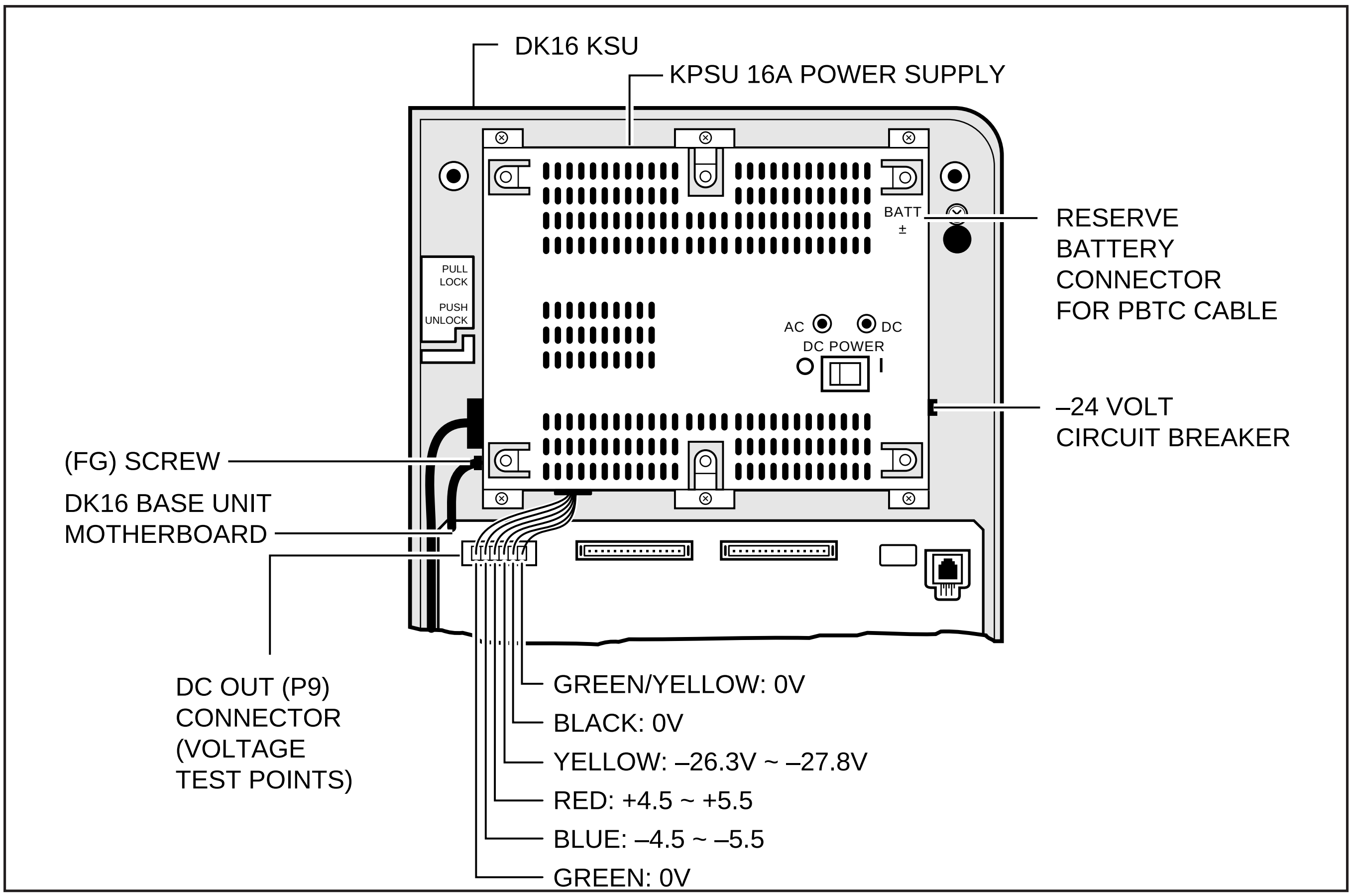


FIGURE 3
KPSU16 DC VOLTAGE TEST

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Important Note:
Do not attempt to replace Fuse F201

7 DK16 HARDWARE FAULT ISOLATION

7.01 If a DK16 hardware fault is suspected, check the hardware using the following procedure:

1) Make sure the BATT jumper plug (SW1 on the base unit motherboard) is in the ON position to save the system's customer data base.

2) Unplug the PBTC battery cable from BATT connector on KPSU16 Power Supply (see Figure 2).

3) Lightly press the -24V circuit breaker to ensure it has not opened (Figure 3). If the circuit breaker has opened and will not rest, remove assemblies (KSTU, KCOU, Expansion Unit PCBs, Expansion Unit) one at a time and try to reset -24V circuit breaker. If it is found lthat one of the removable assemblies causes the circuit breaker to open, replace that assembly. (See Section **100-816-205** for PCB removal and Expansion Unit installation and removal.)
   a) If the -24V circuit breaker cannot be reset with all removable assemblies disconnected, disconnect the DC OUT connect (P9) from the Base unit motherboard and try to reset the -24V breaker.
   b) If the circuit breaker resets when the DC OUT connector is removed, the Base Unit or Power Supply may be defective. Replace the Power Supply first (per Section **100-816-205**) to avoid reprogramming the system.
   c) If the -24V breaker continues to open ;after the power Supply is replaced, install the original Power supply onto the DK16 Key Service Unit (KSU) and replace the KSU with another KSU.

4) If the –24V circuit breaker is not open (Step 3) check the Power Supply DC voltages as follows:
   Using a voltmeter or other device which checks voltage, measure the voltages referenced to frame ground (FG) at the DC OUT connector pins (test points) located on the motherboard (Figure 2). The voltages should fall within the ranges below. If the voltages do not fall within the ranges, unplug the DC power pins from the DC OUT connector and measure again at the same location; if the ranges remain unacceptable, replace the Power Supply.
   - (FG) Yellow-Green Wire: 0V
   - Yellow Wire: – 24V
     - Range: –26.3V ~ –27.8V
   - Red Wire: 5V
     - Range: 4.5V ~ 5.5V
   - Blue Wire: –5V
     - Range: –4.5V ~ –5.5V

4) Check system third wire ground per Section **100-816-202**.

5) If the –24V circuit breaker, DC power, and third wire ground are within required limits, remove all hardware assemblies, one at a time, and test to see if the fault is cleared (remove KSTU, KCOU, K4RCU and Expansion Unit PCBs and remove Expansion Unit per Section **100-816-205**).

6) If the above hardware check did not clear the fault, call your Technical Support Group.

8 STATION CABLE CONTINUITY CHECK

8.01 Voltmeter Test

8.02 The continuity of the cable run between the DK16 KSU and the digital or electronic telephone is checked with a voltmeter as follows:

NOTE:
Perform the following at the locations indicated:
1. *Modular block: Check all stations cables.*
2. *MDF: Check cable from KSU to MDF.*
3. *These tests also apply for troubleshooting cable problems with DDCB and PDIU-DS devices.*
4. *Refer to* Section **100-816-208** *for appropriate MDF wiring diagrams.*

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1) Disconnect the digital or electronic telephone.

2) Using a DC voltmeter, measure between the wires of the two pairs to verify the readings shown in Table B for electronic telephone ports (PEKU or PESU). Refer to Table D for digital telephone ports. The reading will be a plus or minus depending on meter lead placement.

3) An improper reading indicates an open, crossed or shorted wire.

4) For the MDF-to-telephone (digital or electronic) cable, a more precise check is made using an ohmmeter.

8.10 Ohmmeter Test

8.11 The continuity of the cable run between the KSU and digital or electronic telephone is checked with an ohmmeter as follows:

1) Disconnect the electronic or digital telephone.

2) At the MDF, remove the bridging clips.

3) At the MDF, place shorting jumper wires between the T and R of pair #1 (green-red), the T and R of pair #2 (black-yellow) and the T and R of OCA pair #3 (blue-white), for PEKU/PESU only. (For MDF pin numbers, see Section **100-816-208**.)

4) At the modular block, measure the resistance between all wire combinations. The proper readings are shown in Table C for electronic telephones and HDSSs, and Table E for digital telephones, DDSSs and DDCBs.

8.20 Cable Installation

8.21 If cable voltmeter and ohmmeter tests are within limits, digital telephones may not operate because of the following:

1) Digital telephone cable runs must be free of cable splits (single or double). Test for and eliminate all cable splits.

2) Cable bridge taps – Digital telephones will not operate if cable runs contain any type (short or long) of cable bridge. Test for and eliminate all cable bridges.

3) When installing the station cable, do not run parallel to and within 3 feet of an AC power line. AC power lines should be crossed at right (90°) angles only. In particular, avoid running station wire pairs near devices that generate electrical noise, such as neon or fluorescent light fixtures.

4) Check Table 8-D, in Section **100-816-208**. Verify that your telephone is wired correctly (2-pair or External power) for the options it supports (ADM, PDIU-DI, HHEU, DVSU, etc.).

9 FAULT ISOLATION FLOW CHARTS

9.01 The following troubleshooting flow charts are available to aid in fault isolation. It is recommended to read paragraph 1~5 of this section and then proceed to CHART 1, page 7, to begin fault isolation.

TABLE B (ELECTRONIC TELEPHONE CABLES) STATION CABLE CONTINUITY CHECK USING VOLTMETER

FROM			TO			VOLTAGE [3]
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	24 [3]
1	R	Red	2	T	Black	24 [3]
1	T	Green	2	R	Yellow	24 [3]
1	R	Red	2	R	Yellow	24 [3]
1	T	Green	1	R	Red	0
2	T	Black	2	R	Yellow	0
3	T	White	3	R	Blue	0
3	T	White	1	R	Red	0
3	R	Blue	1	R	Red	0
3	T	White	1	T	Green	0
3	R	Blue	1	T	Green	0
3	T	White	2	T	Black	0
3	R	Blue	2	T	Black	0
3	T	White	2	R	Yellow	0
3	R	Blue	2	R	Yellow	0

TABLE C (ELECTRONIC TELEPHONE CABLES) STATION CABLE CONTINUITY CHECK USING OHMMETER

FROM			TO			Resistance
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	open
1	R	Red	2	T	Black	open
1	T	Green	2	R	Yellow	open
1	R	Red	2	R	Yellow	open
1	T	Green	1	R	Red	40 ohms [1]
2	T	Black	2	R	Yellow	40 ohms [1]
3	T	White	3	R	Blue	40 ohms [1]
3	T	White	1	R	Red	open
3	R	Blue	1	R	Red	open
3	T	White	1	T	Green	open
3	R	Blue	1	T	Green	open
3	T	White	2	T	Black	open
3	R	Blue	2	T	Black	open
3	T	White	2	R	Yellow	open

TABLE D (DIGITAL TELEPHONE CABLES) STATION CABLE CONTINUITY CHECK USING VOLTMETER

FROM			TO			VOLTAGE
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	0
1	R	Red	2	T	Black	24 [3]
1	T	Green	2	R	Yellow	24 [3]
1	R	Red	2	R	Yellow	0
1	T	Green	1	R	Red	24 [3]
2	T	Black	2	R	Yellow	24 [3]

TABLE E (DIGITAL TELEPHONE CABLES) STATION CABLE CONTINUITY CHECK USING OHMMETER

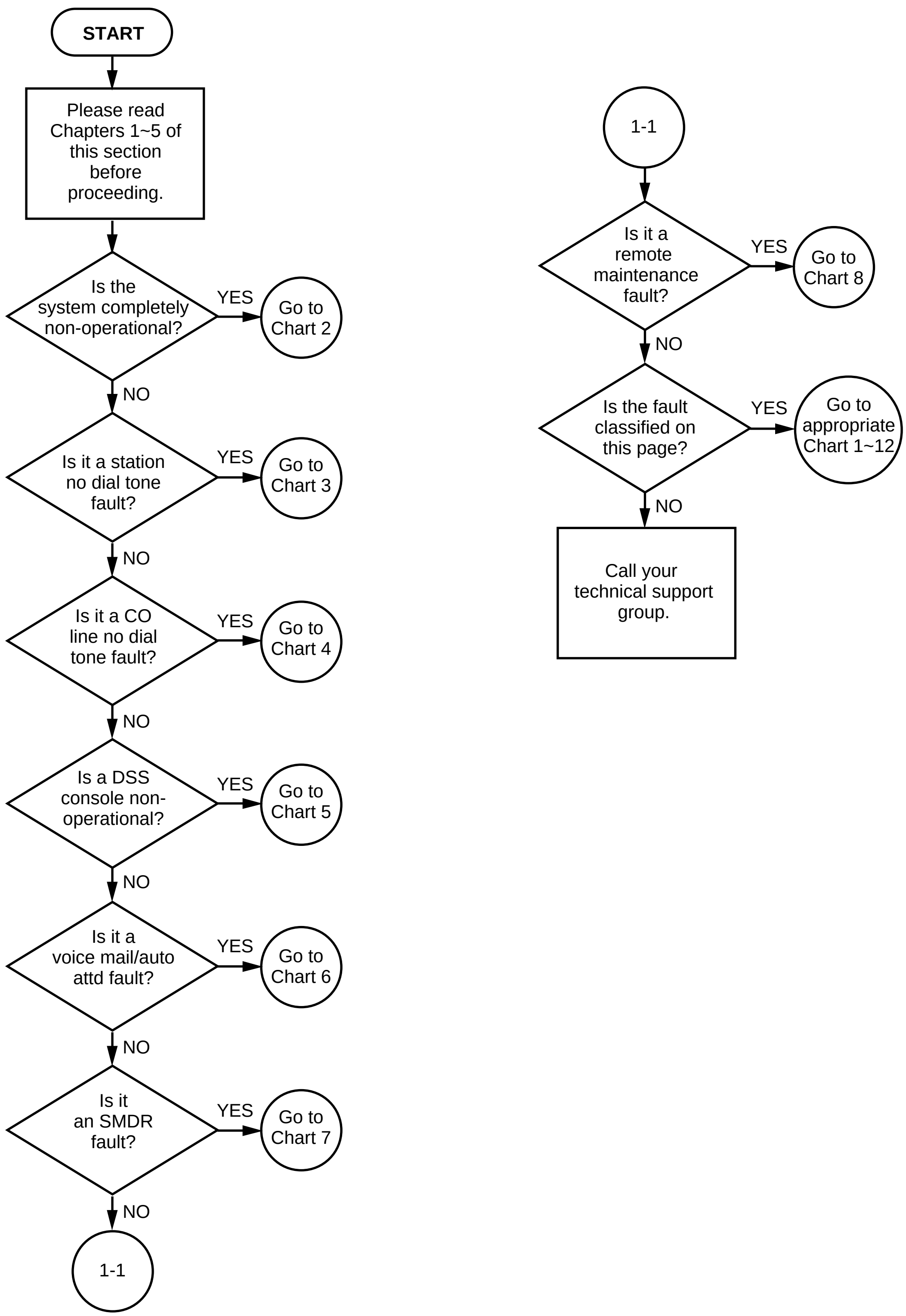
FROM			TO			Resistance
Pair	Wire	Color	Pair	Wire	Color	
1	T	Green	2	T	Black	open
1	R	Red	2	T	Black	open
1	T	Green	2	R	Yellow	open
1	R	Red	2	R	Yellow	open
1	T	Green	1	R	Red	40 ohms [1]
2	T	Black	2	R	Yellow	40 ohms [1]

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NOTES:

1. *This is the maximum allowable reading for all Digital and Electronic telephone cable runs except if connecting an HDSS console to Circuits 7 and 8 of a PEKU—then the maximum cable restriction is 20 ohms, not 40 ohms.*
2. *The green-red, black-yellow and white-blue measurements should be within 10% of each other.*
3. *Nominal voltage—within the limits of ±26.3 ~ ±27.8 VDC while under AC power, polarity depending on voltmeter lead placements.*

CHART NO. 1
FAULT CLASSIFICATION



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CHART NO. 2
CATASTROPHIC FAULTS

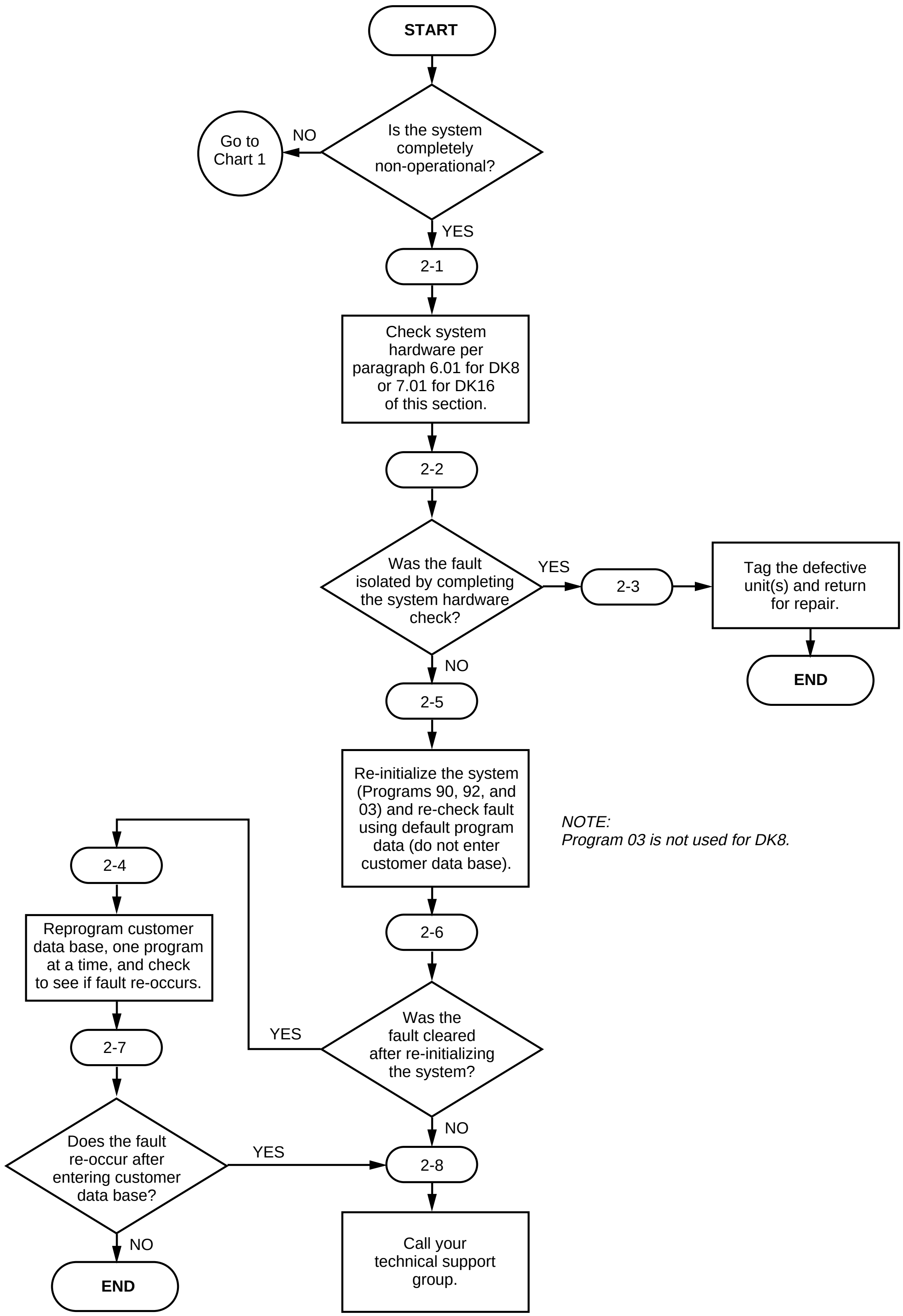


CHART NO. 3
STATION DIAL TONE FAULTS

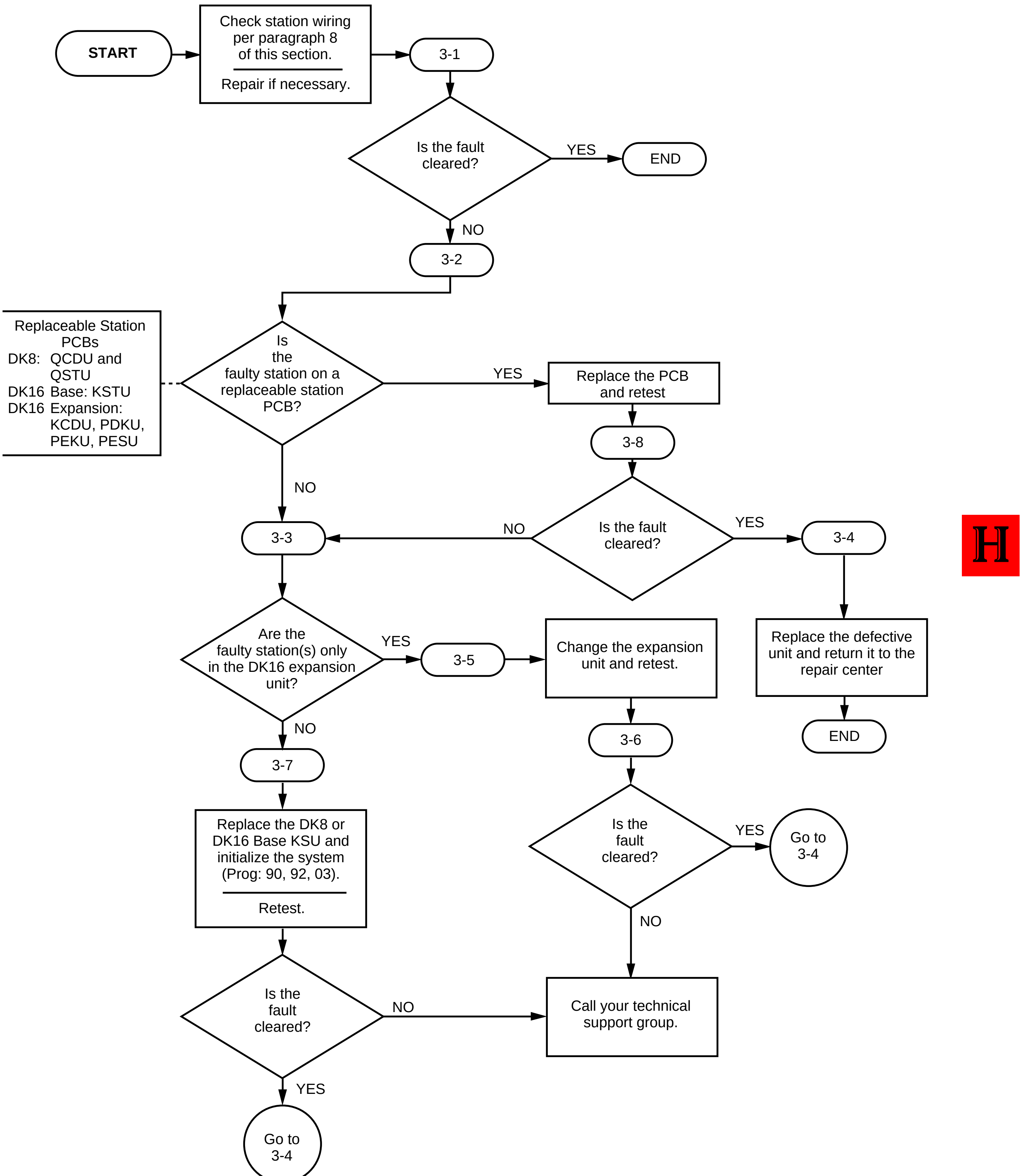


CHART NO. 4
CO LINE DIAL TONE FAULTS

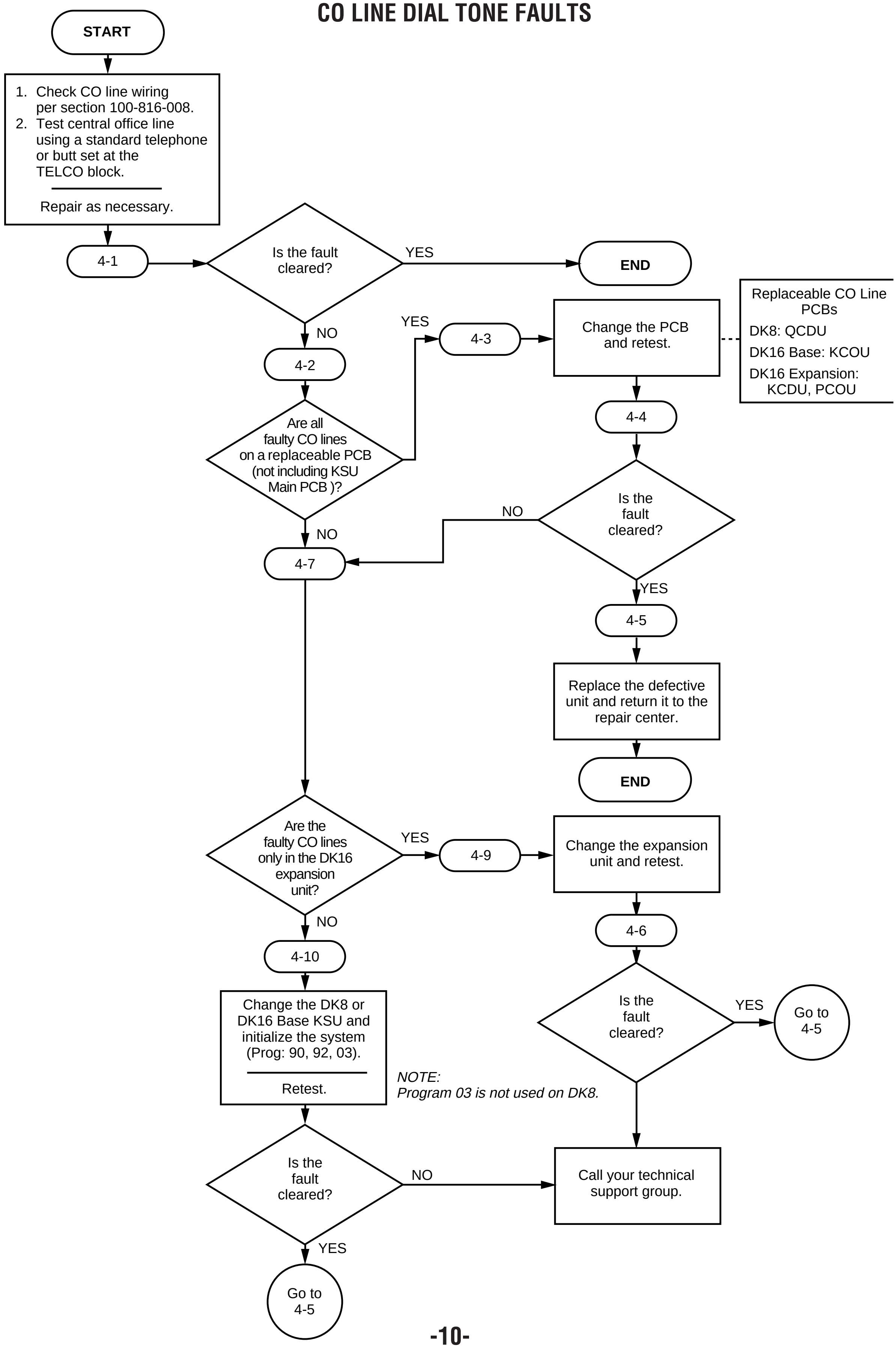


CHART NO.5
DSS CONSOLE FAULTS (DK16 ONLY)

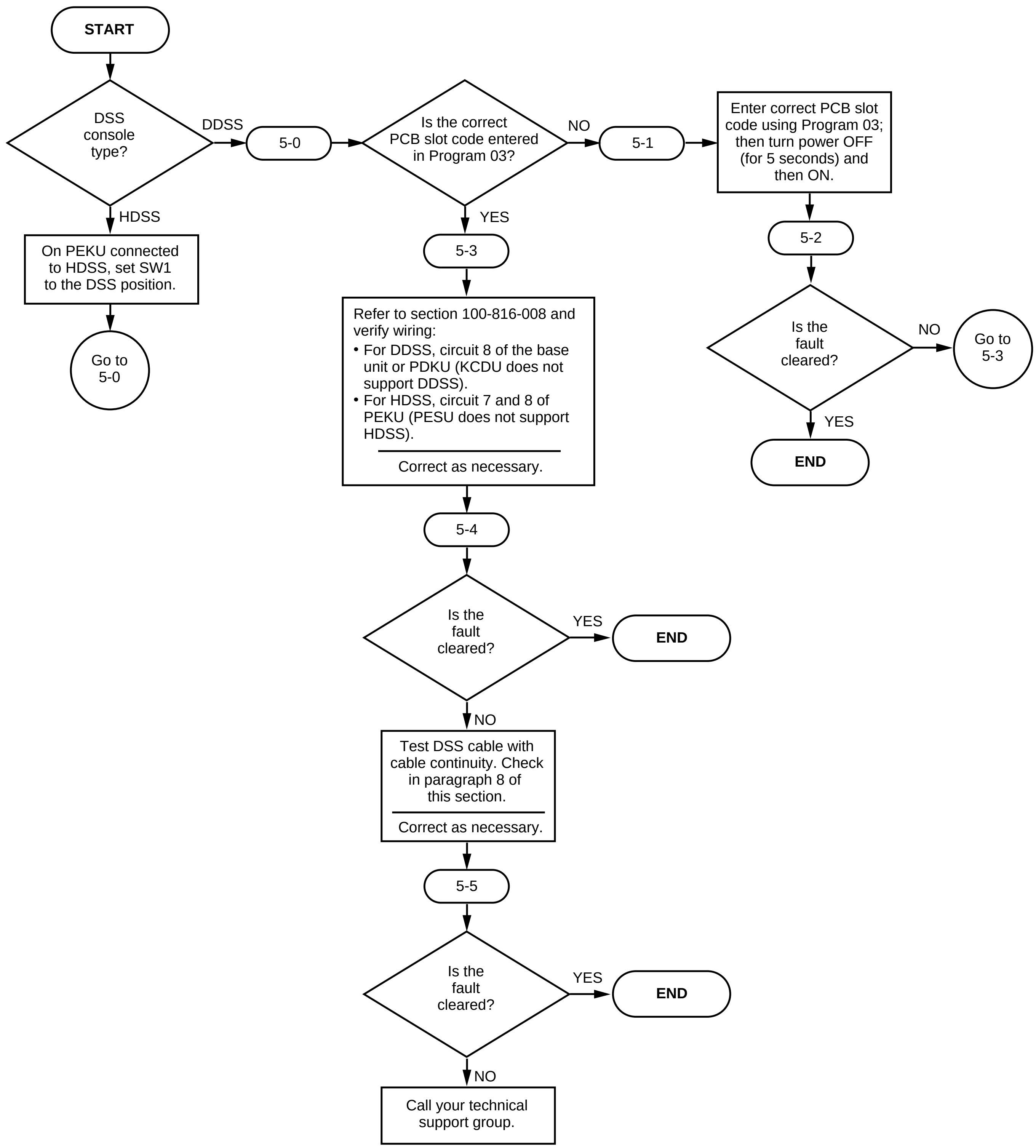


CHART NO.6
VOICE MAIL/(EXTERNAL) AUTO ATTENDANT (VM/AA) FAULTS

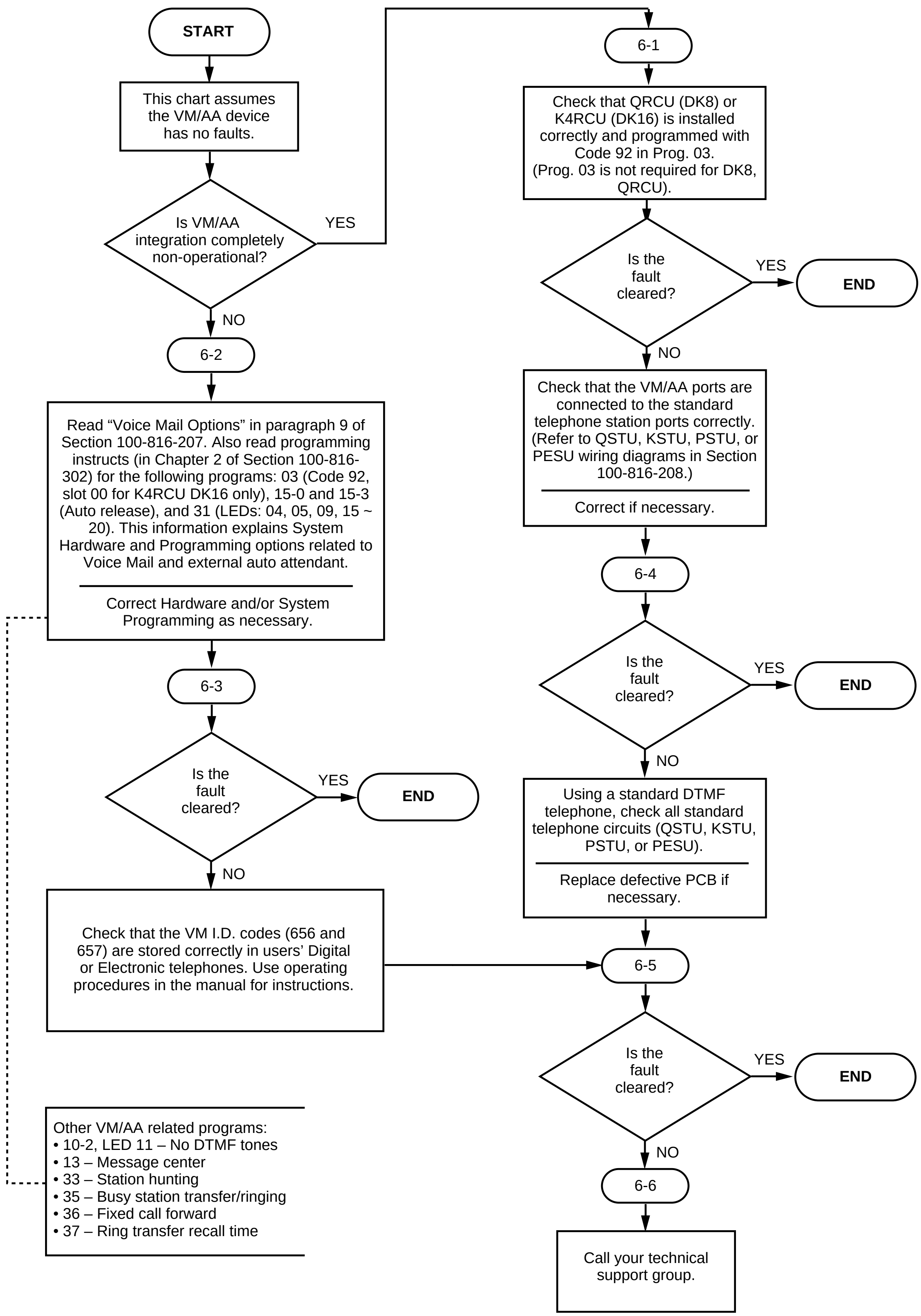
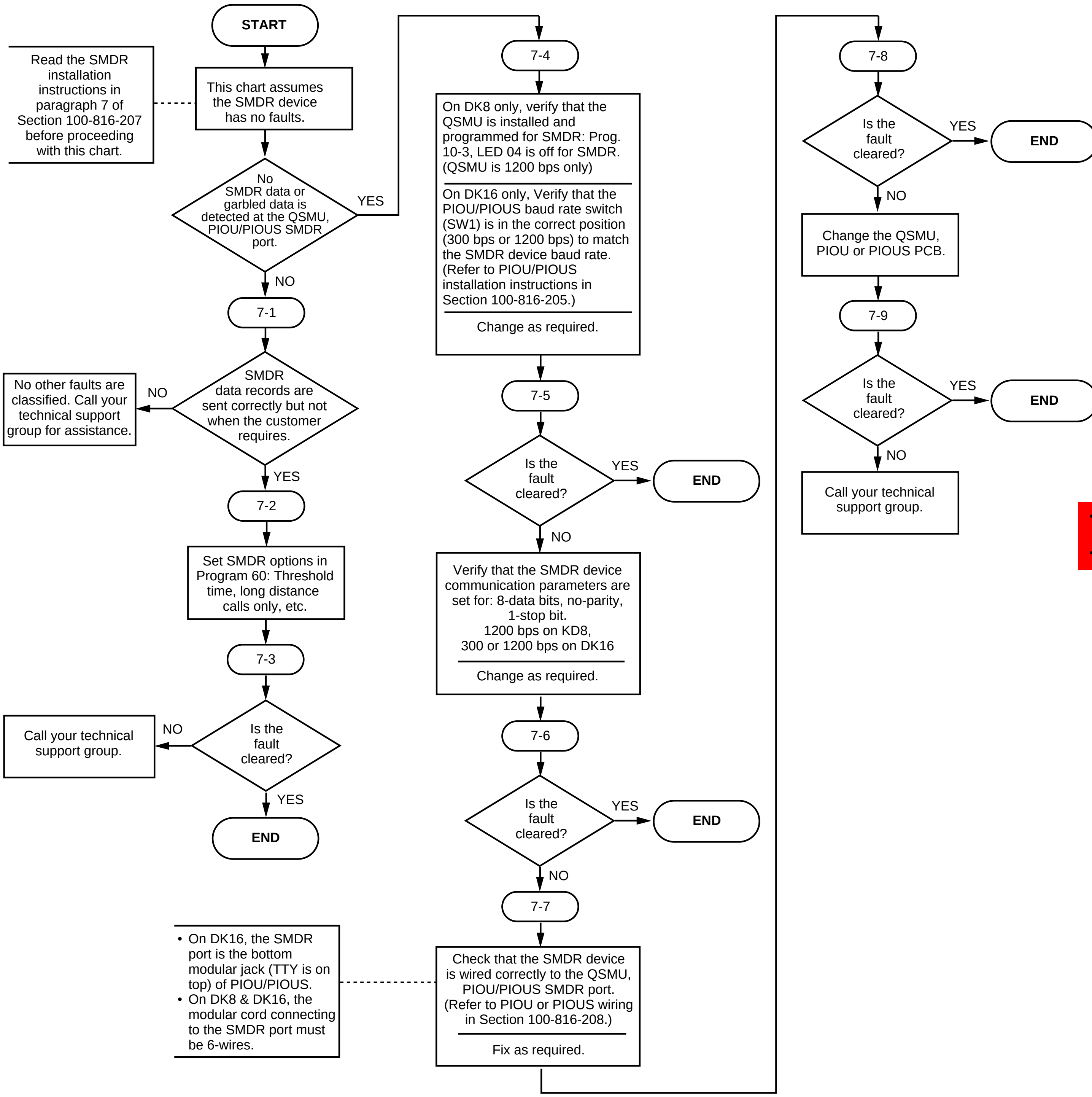
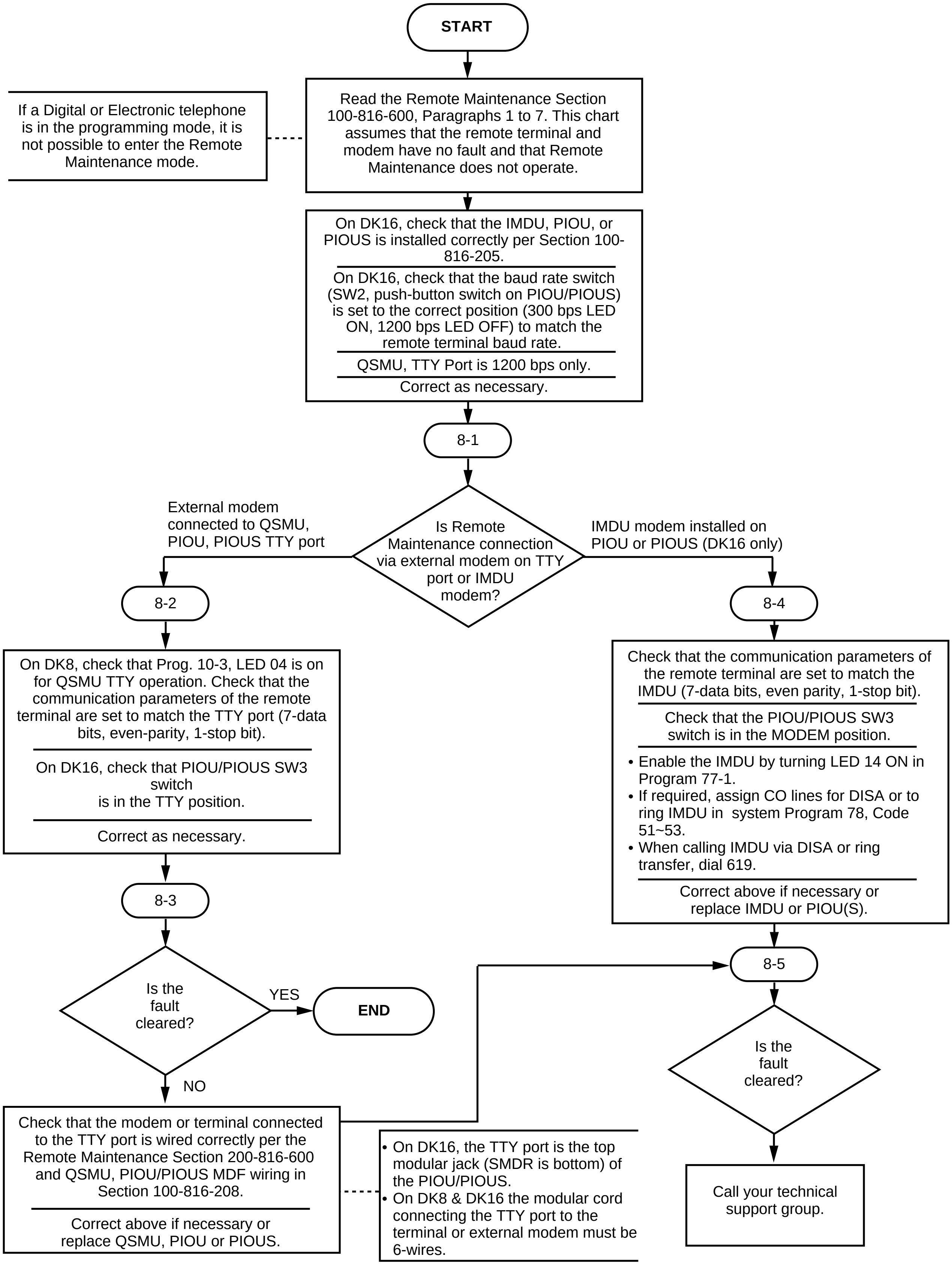


CHART NO.7
STATION MESSAGE DETAIL RECORDING (SMDR) FAULTS



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CHART NO.8
REMOTE MAINTENANCE FAULTS



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Strata® DK8 & DK16

REMOTE ADMINISTRATION AND MAINTENANCE PROCEDURES

H

TABLE LIST

TABLE LIST

H

TABLE LIST (Continued)

FIGURE LIST

INDEX

MESSAGE RECORD SHEET

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1 USING REMOTE ADMINISTRATION AND MAINTENANCE

1.01 Figure 1 is provided as a quick reference aid in using this section.

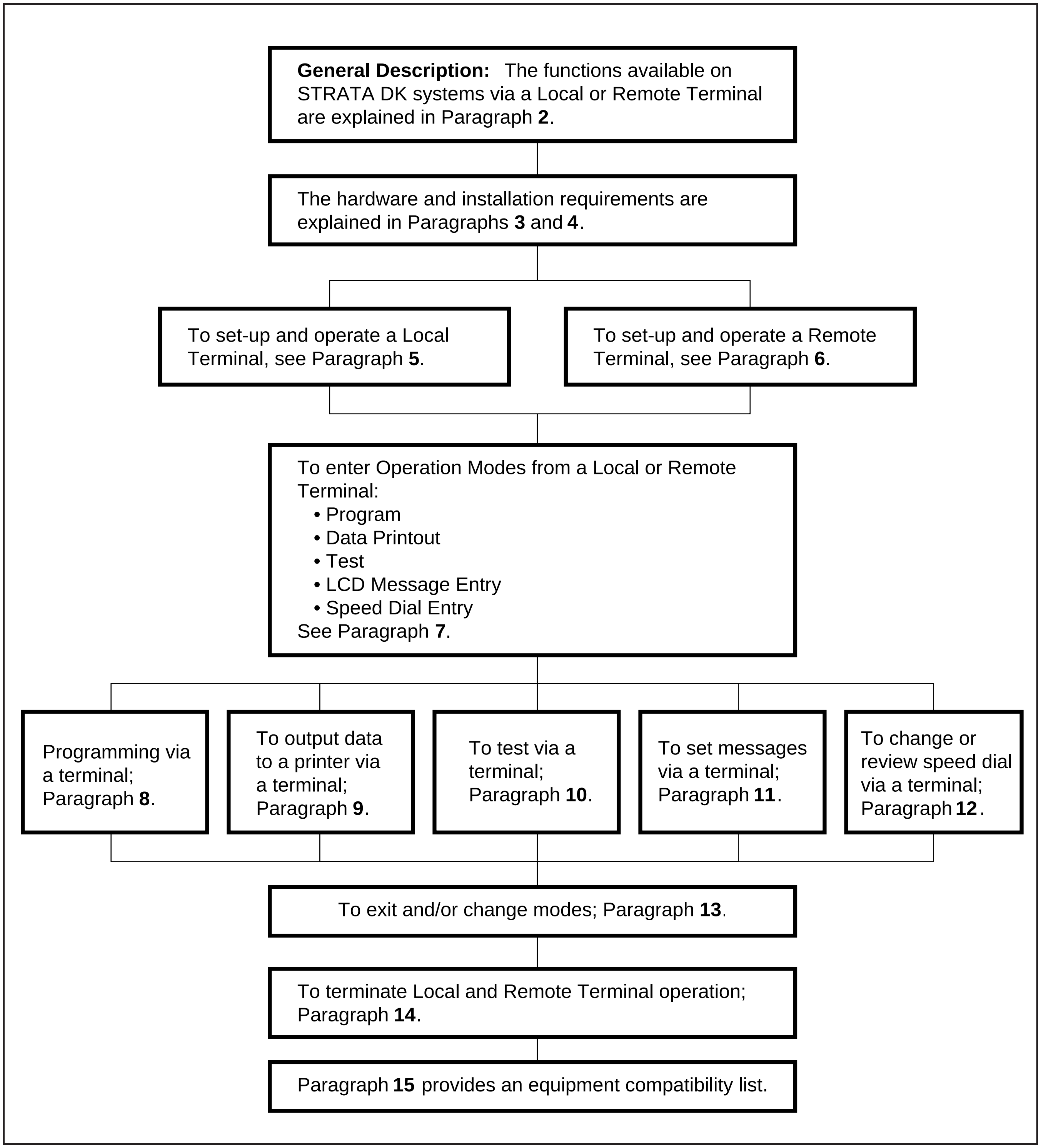


FIGURE 1
SECTION FLOWCHART

2 GENERAL DESCRIPTION

2.01 With the STRATA DK8, Remote Administration and Maintenance is accomplished with a remote terminal/modem communicating over the public telephone network, but only via an external modem connected to a dedicated CO line or standard telephone port. See Figures 2 and 3. With STRATA DK16 Remote Administration and Maintenance is accomplished with a remote terminal/modem communicating over the public telephone network via either an external modem (connected to a dedicated CO line or a standard telephone port); or, a modem unit (IMDU) installed on a PIOU or PIOUS PCB in the Expansion Unit. See Figures 2, 3 and 4.

2.02 Remote Administration and Maintenance calls with the STRATA DK16 may connect to the IMDU automatically via programmable CO line ringing assignments (**Program 81 ~ 89**) or Direct Inward System Access (DISA) CO lines (**Program 78**), or manually via the standard call transfer feature to intercom number 619. Automatic connection and DISA allow remote programming to be accomplished after business hours without on-site assistance. Remote Administration calls with the DK8 or the DK16 via an external modem connected directly to a CO line (instead of an IMDU) connect to the external modem automatically without any special station or CO line ringing assignments. When the external modem is connected to a standard telephone port, the call transfer feature, DISA, and ringing assignments can be utilized to access the Remote Administration.

2.03 Remote Administration and Maintenance allows the following functions to be accomplished remotely:

Program Mode: Provides for complete programming of all STRATA DK8 or DK16 programs.

Test Mode: Provides for testing of STRATA DK8 or DK16 CO lines and stations.

Data Dump Mode: Provides a complete printout of all or individual STRATA DK8 or DK16 customer data base programs, including Speed Dial numbers and LCD messages.

Message Mode: Provides for sending, adding, or changing digital and electronic telephone LCD messages.

Speed Dial Mode: Allows Station and System Speed Dial numbers to be programmed remotely.

NOTE:
*All the functions in the preceding paragraphs are also available via an on-site terminal connected directly to an optional PIOU(S) PCB with DK16, or the optional QSMU PCB with DK8. These functions are also available to a terminal with a modem connected to a standard telephone port (Paragraph **5** and Figure 5).*

2.04 There are two levels of Remote Administration and Maintenance.

Level 1: Allows access to all programs.

Level 2: Allows access to **Programs 30 ~ 39** and **77 ~ 89,** which pertain only to individual station options such as button assignments, class of service, etc.

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2.05 Each Remote Administration and Maintenance level has a different programmable password for customer data base protection. This allows a customer to make certain station moves, adds, and changes in Level 2; while protecting the critical system assignments in Level 1 (refer to **Program 00**).

3 HARDWARE REQUIREMENTS

3.01 For Remote Administration and Maintenance operation, the STRATA DK16 system must be configured with either an IMDU-equipped PIOU(S) PCB in the optional Expansion Unit or an external modem connected to a PIOUS(S) and a dedicated CO line or standard telephone circuit. (See Figures 2, 3, and 4.) The STRATA DK8 must be configured with a QSMU PCB and an external modem connected to a dedicated CO line or standard telephone circuit. (See Figures 2 and 3.)

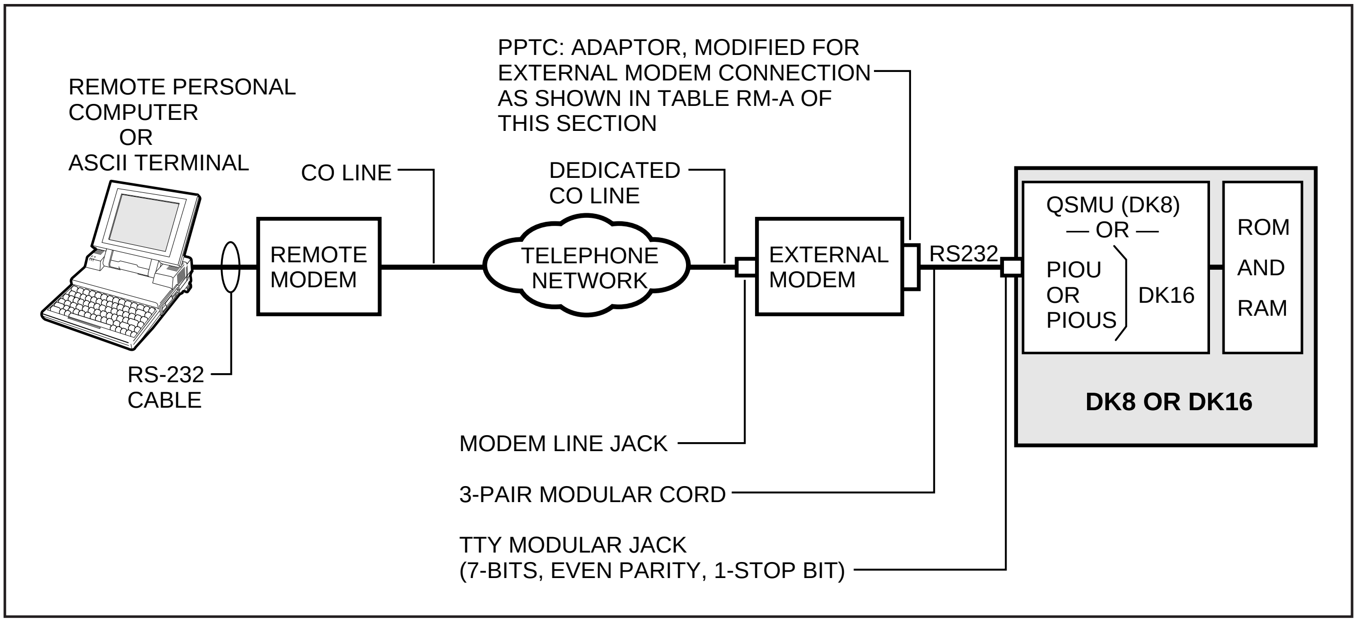


FIGURE 2
REMOTE MAINTENANCE EXTERNAL MODEM CONNECTION FOR DK8 & DK16 METHOD ONE

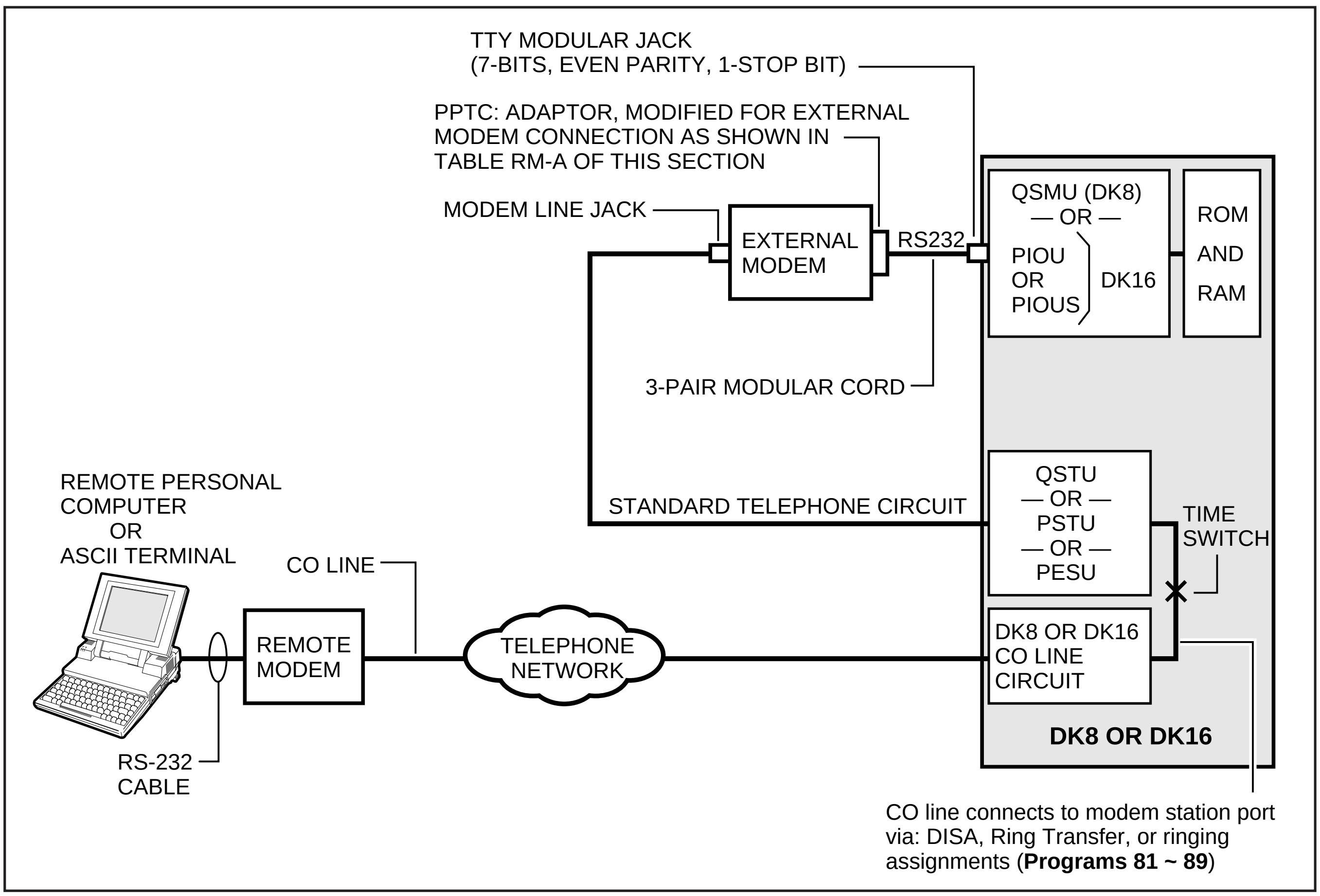


FIGURE 3
REMOTE MAINTENANCE EXTERNAL MODEM CONNECTION FOR DK8 & DK16 METHOD TWO

TABLE RM-A
PPTC MODIFIED WIRING FOR EXTERNAL MODEM TO TTY CONNECTION

PPCT (Modular to DB25) ADAPTOR, MODIFIED WIRING FOR CONNECTING TTY JACK TO AN EXTERNAL MODEM:

QSMU OR PIOU/PIOUS, TTY JACK MODULAR PIN NO.	PPTC1A-5M ADAPTOR		MODEM RS-232 LEAD NAME
	MODULAR PIN NO.	DB25 PIN NO.	
→ 1 to RD	RD, 6 to	3*	RD
← 2 to TD	TD, 5 to	2*	TD
→ 3 to DSR	DSR, 4 to	6	DSR
← 4 to DTR	DTR, 3 to	20*	DTR
→ 5 to DCD	DCD, 2 to	8*	DCD
— 6 to SG	SG, 1 to	7	SG
		4 Jumper to 5	RTS to CTS

*IMPORTANT: * PPTC1A-5M, pins 2 & 3 and pins 8 & 20 must be reversed in the field, as shown, for modem connection. Set Hayes modem to track status of carrier detect signal (AT & C1) and to answer (ATS0 = 1).*

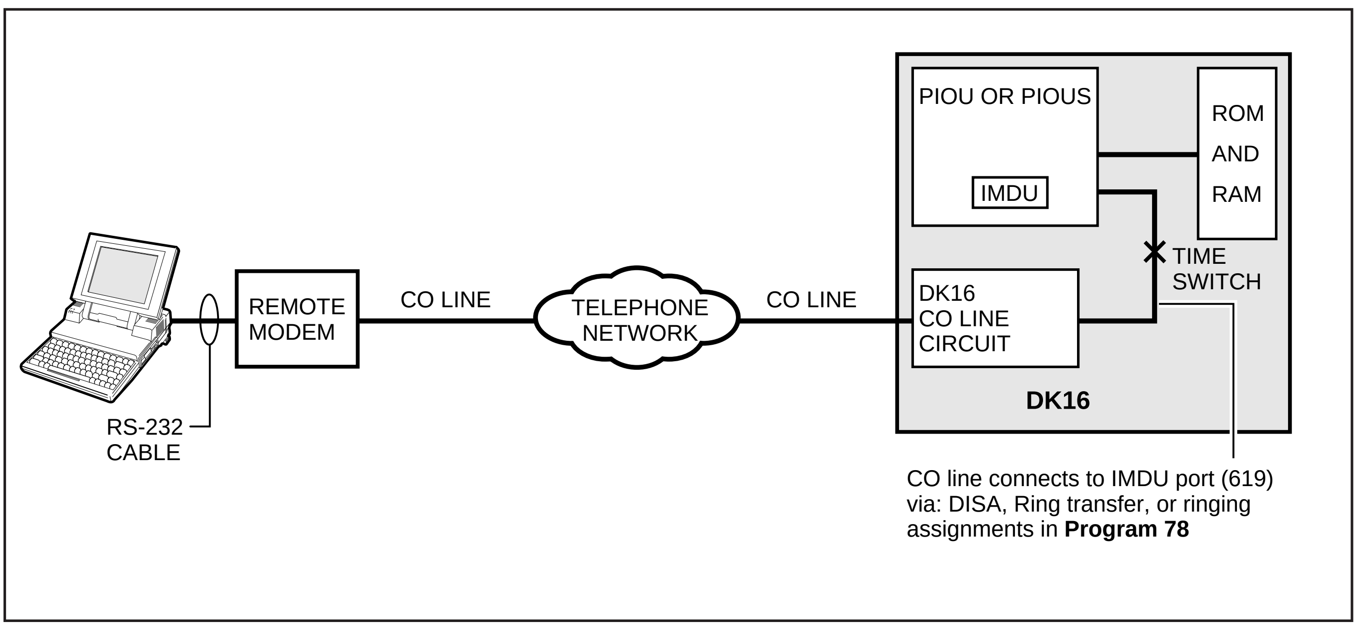


FIGURE 4
REMOTE MAINTENANCE USING IMDU MODEM (DK16 ONLY)

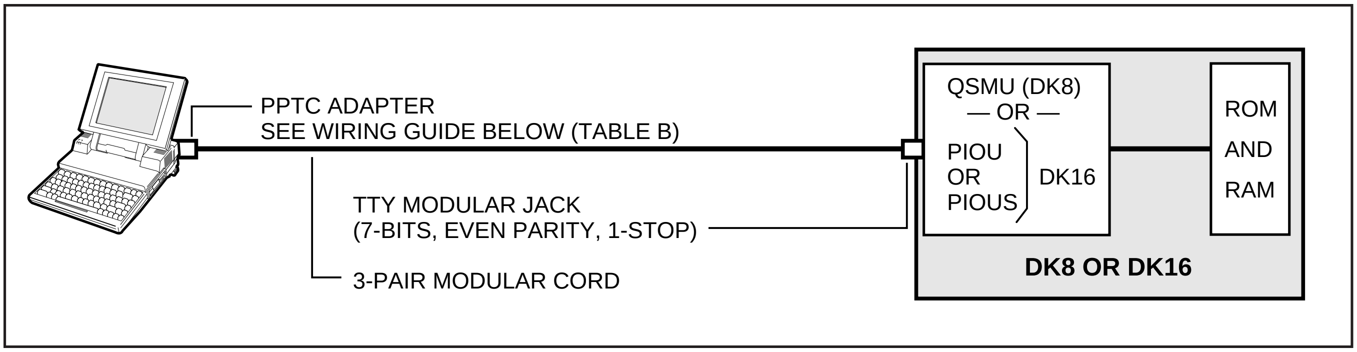


FIGURE 5
LOCAL MAINTENANCE USING ASCII TERMINAL OR PERSONAL COMPUTER

TABLE RM-B
PPTC WIRING FOR LOCAL TERMINAL OR PERSONAL COMPUTER TO TTY CONNECTION

PPTC (MODULAR TO DB25) ADAPTOR WIRING FOR CONNECTING TTY JACK TO A LOCAL TERMINAL OR PERSONAL COMPUTER SERIAL COMMUNICATIONS PORT.

QSMU OR PIOU/PIOUS, TTY JACK MODULAR PIN NO.	PPTC1A-5M ADAPTOR		DTE RS-232 LEAD NAME
	MODULAR PIN NO.	DB25 PIN NO.	
→ 1 to RD	RD 6 to —	3	RD
← 2 to TD	TD 5 to —	2	TD
→ 3 to DSR	DSR 4 to —	6	DSR
← 4 to DTR	DTR 3 to —	20	DTR
→ 5 to DCD	DCD 2 to —	8	DCD
— 6 to SG	SG 1 to —	7	SG
		4 Jumper to 5	RTS to CTS

4 TERMINAL/MODEM INSTALLATION

4.01 DK8 and DK16 provide customers with a number of Remote Administration and Maintenance configuration options:

- A customer-supplied maintenance terminal can be connected to the system TTY port (DK8 QSMU, or DK16 PIOU or PIOUS) via an external modem either locally (Figure 5) or remotely (Figures 2 and 3).
- With the DK16, the IMDU modem (300 or 1200 baud full-duplex) can be connected to the DK16 PIOU or PIOUS to allow system programming and testing to be accomplished from a remote location (Figure 4).
- Instead of a modem or terminal, a Stand-alone Data Interface Unit (PDIU-DS) can be connected to the TTY port on the QSMU (DK8) or PIOU/PIOUS (DK16) so that maintenance and programming can be administered internally or externally from desktop personal computers or terminals connected to Integrated Data Interface Units (PDIU-DIs).

NOTES:

1. *An external modem is required for Remote Maintenance if a QSMU is installed on DK8, or if an IMDU is not installed on DK16 PIOU or PIOUS. The IMDU has a built-in maintenance channel for remote connection; however, an external modem requires a CO line or standard telephone port (Figures 2 and 3).*
2. *The DK16 PIOU or PIOUS can only be installed in the Expansion Unit.*

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4.10 Maintenance Terminal/External Modem Option System Hardware Requirements

4.11 The STRATA DK8 must be equipped with a QSMU PCB and the DK16 with a PIOU or PIOUS PCB to support the maintenance terminal/external modem options. Connecting the maintenance terminal or external maintenance modem to the QSMU, PIOU, or PIOUS PCB is accomplished with a standard three-pair modular cord and a PPTC adaptor connected to the PCB TTY jack.

4.20 DK8 and DK16 Local Maintenance Terminal Installation

4.21 Install the ASCII terminal in accordance with the following steps (Figure 5):

1) Connect the three-pair modular cable (24 AWG twisted pairs) and the PPTC adaptor from the DK8 QSMU or DK16 PIOU or PIOUS TTY port to the remote maintenance terminal DB25 connector.

2) For the DK8 QSMU, set **Program 10-3**, LED 04 ON for TTY operation.

3) For the DK16, set the PIOU or PIOUS SW2 switch to match the modem or terminal baud rate as follows:
   - Push in for 300 bps (baud rate indicator **CD4** is lit); let out (by pushing again) for 1200 bps (**CD4** is not lit).

NOTE:
The DK8 QSMU baud rate is always 1200 bps.

4) For DK16, set the PIOU or PIOUS **SW3** switch to the TTY position.

NOTE:
*The PIOU or PIOUS **SW3** switch is set to **MODEM** position for IMDU operation only.*

5) For DK16, set the **P13** jumper plug on the PIOU to the **BELL** configuration, or cut the **W4** jumper on the PIOUS (also for **BELL** configuration).

NOTE:
*The **P13** (PIOU) and **W4** (PIOUS) **CCITT** configurations are not normally used in the USA.*

6) For DK8 and DK16, set terminal communication parameters to seven bits, even parity, one-stop bit (300, or 1200 bps. See step 3 above).

NOTE:
If a digital or electronic telephone is in the program mode, programming from the maintenance terminal is not allowed.

4.30 Remote Maintenance Option Installation

4.31 DK16 IMDU Maintenance Modem (Figure 4). The IMDU mounts on the PIOU or PIOUS PCB and provides 300 or 1200 bps, full-duplex communication for remote maintenance (seven bits, even parity, one-stop bit). If the IMDU is employed, a dedicated CO line or standard telephone port is not required. Connection of the remote maintenance terminal is through existing system CO lines via intercom number 619. Refer to the PIOU or PIOUS portion of Section **200-816-205** for hardware installation and programming requirements.

4.32 DK8 and DK16 External Maintenance Modem Installation. Refer to Figure 2 or 3, as applicable, and install the external modem in accordance with the following steps:

NOTE:
*The Toshiba **PPTC** RS-232 modular-to-DB25 adaptor is factory configured for ASCII terminal connection. Pins 2 and 3 and Pins 8 and 20 of the adaptor must be reversed for external modem connection (see Table RM-A).*

1) Connect the modular cord from the DK8 QSMU or DK16 PIOU or PIOUS TTY port to the PPTC adaptor and then to the external maintenance modem RS-232 25-pin connector.

2) Connect the external maintenance modem line-side to a dedicated CO line (tip and ring) or to a dedicated standard telephone port, tip and ring (QSTU with DK8; KSTU, PSTU, or PESU with DK16). Refer to Wiring Diagrams, **Section 200-816-208**, for wiring/interconnecting details.

3) For DK16, set the PIOU or PIOUS **SW2** switch to match the modem or terminal baud rate:
   - Push in for 300 bps (baud rate indicator

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CD4 is lit); let out (by pushing again) for 1200 bps (**CD4** is not lit).

NOTE:
The DK8 QSMU baud rate is always 1200 bps.

4) For DK16, set the PIOU or PIOUS **SW3** switch to the TTY position.

NOTE:
*The PIOU or PIOUS **SW3** switch is set to the **MODEM** position for IMDU operation only.*

5) For DK16, set the **P13** jumper plug on the PIOU to the **BELL** configuration, or cut the **W4** jumper on the PIOUS (also for **BELL** configuration).

NOTE:
*The **P13** (PIOU) and **W4** (PIOUS) **CCITT** configurations are not normally used in the USA.*

6) The communication parameters for the terminal that will be used to communicate through the external modem connected to the TTY port should be set to seven-bits, even parity, one-stop bit. (300 or 1200 bps, see step 3 above).

7) Programming and system testing, via the external maintenance modem, is described later in this section. Access to the external maintenance modem is accomplished as follows:
   - If the modem is connected to a dedicated CO line, call the CO line number to establish modem communication.
   - If the modem is connected to a standard telephone port, call a STRATA DK CO line that can be transferred to (or programmed to ring) the standard telephone modem port to establish modem communication. It is also possible to establish communications by calling in on a STRATA DK DISA CO line and dialing the intercom number of the modem connected to the standard telephone port.

4.40 Programming

4.41 If an IMDU is used on DK16, enable the IMDU in **Program 77-1** (LED 14). If using an external modem with STRATA DK16 or DK8, skip LED 14 in **Program 77-1**.

4.42 For DK8 only, turn LED 04 **"ON"** in **Program 10-3** to activate the QSMU for external modem operation.

4.43 For DK16 only, if Remote Administration and Maintenance calls are to connect to the IMDU automatically, assign the designated CO lines to ring the IMDU intercom number (619) in **Program 78** as required (use standard STRATA DK16 programming procedures).

4.44 For all cases of Remote/Local Maintenance with a PC or ASCII terminal for either STRATA DK8 or STRATA DK16 program the security codes for Levels 1 and 2 as in the Programming Procedures, Section **200-816-300**. Reference **Program 00**.

NOTE:
The security codes are initialized as "0000". These codes may also be changed via a local or remote terminal.

4.50 DK16 IMDU On-site Testing

4.51 From any working station, test the functioning of the IMDU for DK16.

1) Press the **Intercom** button.
   - Receive intercom dial tone.

2) Dial **6 1 9**.
   - Receive modem tone from the IMDU after a two-second delay.

3) Press the **Speaker** button to release.

4) Make an incoming call over each CO line that is programmed to ring the IMDU (station 619).
   - Receive modem tone from the IMDU after a two-second delay with each call.

NOTE:
This test checks basic programming and IMDU operation, and should be completed before

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continuing with Remote Administration and Maintenance installation.

5) If a terminal is to be utilized on-site, refer to Paragraph **5**. For off-site programming refer to Paragraph **6**.

5 LOCAL TERMINAL OPERATION

5.00 Requirements

5.01 For DK16, the optional Expansion Unit must have a PIOU or PIOUS PCB installed to perform on-site Remote Administration from a local terminal. For DK8, a QSMU PCB is required. Paragraph **4** and **Figure 5** provide installation details on local terminal installation.

5.02 The local terminal for either the STRATA DK16 or the DK8 must have an EIA RS-232 interface, communicate in ASCII code at 300 or 1200 bps (1200 bps only for DK8), have a standard typewriter-type keyboard, and display data via a CRT display or printer. A personal computer (PC) capable of emulating the described terminal with a communications software package (such as PROCOMM) may also be used (Figure **5**).

5.03 Operating the PC or terminals, local or remote, is identical. The only difference is the physical connection and the method used to establish initial communications.

5.10 Set-up

5.11 Refer to Figure 2 and verify that the local terminal is connected and set-up as follows:

1) Connect the RS-232 cable to the terminal connector and the PIOU(S) or QSMU TTY connector.

NOTE:
If a personal computer is being used, connect the cable to the serial "COM" port.

2) Set the PC or terminal baud rate to match the DK16 SW2 PIOU(S) setting (300 or 1200 bps) or the DK8 QSMU setting (1200 bps).
3) Set the terminal for "Full Duplex" operation.
4) Set the keyboard for "Caps Lock" on.
5) Set the parameters of the terminal (or modem) connected to the TTY to:
   Word length: Seven bits
   Stop bits: One
   Parity: Even

5.20 Local Operation

5.21 Use the procedure below to establish communications between the local terminal and the PIOU(S) or the QSMU so that programming may be accomplished via the terminal.

NOTE:
Hereafter, whenever the term **CR** *is used, it means the return or enter key, depending on the keyboard being used.* **SPACE** *means the space bar. An empty square indicates one of several characters will appear in that location (either on the terminal screen or in a printout).*

1) Set-up the terminal as described in Paragraph **5.10**.
2) Set the terminal to on-line.
3) Set "Caps Lock" on (upper case).
4) Press **CR** key.
   - The system responds, and the terminal displays:

     DK CONNECT

     > CODE
5) Type the four-digit security code, and press **CR**. (Default code = 0000.)
   - The system responds, and the terminal displays:

     OK
     MODE

NOTE:
The security code can be entered any time the CODE prompt appears.

6) To continue, go to Paragraph **7**.

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6 REMOTE TERMINAL OPERATION

6.00 Requirements

6.01 Terminal: For the STRATA DK8 or the STRATA DK16, the terminal must interface with an

asynchronous modem, communicate in ASCII code at 300 or 1200 bps (1200 only for DK8), have a standard typewriter-type keyboard, and display data via a CRT display or printer. A personal computer capable of emulating the described terminal with a communications software package (such as PROCOMM) may also be used. (See Paragraph **15** for compatible personal computers).

6.02 Modem: For either system, the modem must be full-duplex asynchronous, operate at 300 or 1200 bps (1200 only for DK8) and have an RS-232 interface to connect with a terminal or PC (as described in Paragraph **6.01**). It must interface with the public telephone network and be compatible with Bell 103 or 212 modem specifications.

6.10 Set-up

6.11 Refer to Figures 2, 3, and 4, and verify that the remote terminal is connected and set-up as follows:

1) Connect the terminal and modem together with the RS-232 cable.

NOTE:
If a personal computer is being used, connect the cable to the serial "COM" port.

2) Connect the modem line input to a CO/PBX line for access to the public telephone network.

3) Set the terminal and modem baud rate to match the DK16 PIOU(S) setting (300 or 1200 bps) or DK8 QSMU setting (1200 bps).

4) Set the terminal and modem for "Full Duplex" operation.

5) Set the terminal parameters to:
Word length: Seven bits
Stop bits: One
Parity: Even

6.20 Remote Operation

6.21 Automatic connection via ringing assignments: To establish communication between the remote terminal and the IMDU or an external modem connected to a dedicated CO line, call the number of the system CO line assigned to ring the IMDU or the external modem via the remote terminal/modem set-up:

1) Observe the following:
   - When the CO line rings-in, it will connect to the IMDU or the external modem and the IMDU or external modem will respond by returning modem answer tone to the remote modem.
   - The remote modem will return modem tone to the IMDU or external modem and communication will be established.
   - When communication is established, the terminal will display: CONNECTED or COMMUNICATIONS (see Note in Paragraph **6.22**).

2) To continue, Press **CR** and enter the security code per Paragraph **6.30.**

6.22 Manual connection via call transfer:

1) Using a telephone (at the remote location) that can switch to the terminal/modem, dial the number of a system CO line.

2) When the call is answered, request that it be transferred to station 619 if an IMDU is being used. For applications where an external modem is connected to a dedicated standard telephone port, ask to be transferred to the intercom number assigned to the modem.

3) After the call is transferred and you hear modem tone from the IMDU or external modem, switch the call from the telephone to the terminal/modem.

4) Observe the following:
   - When the CO line is transferred, it will connect to the IMDU or external modem.
   - The IMDU or the external modem and the remote modem will respond to each other with modem tone and communication is established.

- When communication is established, the terminal will display: CONNECTED or COMMUNICATIONS (see Note).

NOTE:
If the connection is not completed or communication is unsuccessful, the remote terminal will display: **NO CARRIER.** *If this is the case, check that the equipment is installed per Paragraph **5.10** or **6.10** of this section and try again.*

6.30 Operation

6.31 Once communication is established between the remote terminal and the IMDU or external modem, follow the steps below to enter the security code and receive the MODE prompt.

NOTE:
Hereafter, whenever the term **CR** *is used, it means the return or enter key, depending on the keyboard being used.* **SPACE** *means the space bar. An empty square indicates one of several characters will appear in that location (either on the terminal's screen or in a printout).*

1) Set the keyboard for "Caps Lock" on.

2) Press the **CR** key.
   - The system responds, and the terminal displays:

   DK CONNECT
   >CODE

3) Enter the four-digit security code and press the **CR** key. (Default code is "0000".)
   - The system responds, and the terminal displays:

   OK
   MODE

7 MODE SELECTION

7.00 Selecting a Mode

7.01 To enter an operating mode for either the DK8 or the DK16, establish communication with the terminal, enter the security code, and press the **CR** key to receive the MODE prompt.

NOTE:
*Refer to Paragraphs **5.20** or **6.20** to accomplish the above.*

1) Set the keyboard for "Caps Lock" on (the mode name must be entered in capital letters).

2) At the MODE prompt, enter the desired mode name (Table **RM-C**).

TABLE RM-C—PROGRAMMING PROMPTS

Mode Function	Mode Name	Prompt Return
Program	PROG	P
Data Dump	DUMP	D
Test	TEST	T
LCD Messages	MESG	(NONE)
Speed Dial No.	REPT	R

3) Press the **CR** key.

4) Verify the correct prompt return (Table **RM-C**).

8 PROGRAM MODE

8.00 General

8.01 Data governing overall system operation and feature execution for the systems are stored in read-only memory (ROM) and cannot be altered in the field. However, the data controlling operation of the various options, both system and station, are stored in random-access memory (RAM) and can easily be changed according to individual installation requirements.

8.02 All options are controlled by selections made in the System Record Sheet. An initialization process is provided for verifying predetermined system assignments. The installer can then proceed with any necessary changes.

8.03 Internal battery power is provided to prevent loss of system data memory in the event of a power failure.

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8.10 System Record Sheets

8.11 Before system data can be programmed, the System Record Sheets which contain the customer data base must be available (see Programming, Section **200-816-302**).

8.20 Program Types

8.21 There are three types of programs:

Type 1: All Type 1 programs use the same procedure; however, each button/LED has a different meaning, depending on the program number. The status of this data is reviewed, changed, and stored in system memory using Type 1 program procedures.

Type 2: All Type 2 programs follow the same entry procedure; however, they require port number and button/LED entries. Each button/LED has a different meaning, depending on the program number.

Type 3: In this type program, the information shown in the System Record Sheet indicates the data to be stored in system memory. Each program has a different meaning, and the data is reviewed, changed or stored in memory using an individual procedure for each program.

8.30 Multiple Station (Range) Programming

8.31 Some programs select options for individual stations (where □ □ represents the port number being programmed). To save time, it is possible to program all ports or a range of ports simultaneously.

8.32 Multiple station programming is accomplished by substituting a range of ports (□ □ * □ □) for the port number part (□ □) of the program.
Example, all ports: **0 0 * 0 9** (DK8) or **0 0 * 1 9**
(DK16)

8.33 When the multiple station range is entered, the terminal displays existing data as follows:

Y or N: Y or N indicates if a button LED is ON or OFF; if DATA is the same for all ports in the dialed group: Y = button/LED "ON"; N = button/LED "OFF."

U: If DATA is not the same for all ports, U indicates that the button/LED is "ON" for at least one, but not all ports, in that group.

8.40 Programming Procedures

1) Refer to a completed System Record Sheet.

2) Place the terminal into the program mode per Paragraph **7**.

3) Program procedures are categorized and presented in the following order. Use these procedures to store System Record Sheet data in working memory.
   a) Initialization procedures:
      These procedures must be completed whenever a system is first installed (see Type 3 programs).
   b) Type 1 programs:
      10-1, 10-2, 10-3, 15, 16, 42-0, 77-1, 77-2.
   c) Type 2 programs:
      Station Class of Service;
      20, 30, 31, 35, 40, 41, 43, 79, 81 ~ 89.
   d) Type 3 programs:
      - Initialization; **90, 92**
      - General; **00, 01, 02 03, 04, 05, 12, 13, 21, 22, 19, 28, 29, 32, 33, 34, 36, 37, 38, 39, 42-1 ~ 8, 44, 60, 69, 70, 78, 80, 93**.
      - Toll Restriction; **45 ~ 48**.
      - Least Cost Routing; **50 ~ 56**.

9 DATA DUMP MODE

9.00 General

9.01 This mode allows three types of data to be displayed or output to a printer: Programs (Customer Data Base), Speed Dialing Numbers (Station/System), and LCD Messages (Station/System).

9.02 The three procedures for the Data Dump mode are called: Program Dump, Speed Dialing Dump, and LCD Messages Dump.

9.03 Program Dump: While in the dump mode (see Paragraph 7), enter "PRG" and up to three characters and press **CR**. The alphanumeric char-

acters represent a program group or a particular program, i.e., ALL, **03**, **04**, **10**, **39**, etc. For a printout example, see Figure 6.

> *NOTE:*
> *Programs are output only in the groups indicated. To print out or review a program not included above, use Program Mode procedures.*

9.04 Speed Dialing Dump: While in the dump mode (see Paragraph 7), enter "REP" and two or three characters and press **CR**. The characters represent the speed dialing codes for either an individual station, **A L L** (all stations and system data) **S Y S** (system data only).

9.05 LCD Messages Dump: While in the dump mode (see Paragraph 7), enter "MSG" and two or three characters and press **CR**. The characters represent stored messages for either an individual station, **A L L** (all stations and system data) or **S Y S** (system data only). For a printout example, see Figure 7.

9.06 Tables provide a quick reference to the step-by-step procedures to output the appropriate data.

10 TEST MODE

10.00 General

10.01 The remote test mode (see paragraph 7) can be used to test STRATA DK8 or DK16 stations and CO line circuits from an off-site location.

10.02 This testing function is accomplished by accessing stations from the remote terminal, and activating various buttons on digital and electronic telephones to make telephone calls, set function buttons, change the system time and date, etc. (see Figure 8 and Tables RM-BS ~ BV).

IMPORTANT!

> ***Any digital or electronic telephone button can be activated from the remote terminal at any time while in the Test Mode (even while the end user is using the telephone). Therefore, caution must be used to prevent service interruption or interference. The Test Mode provides status tests to check whether or not a station or CO line is in use. The status checks should always be made before performing other tests (see Table RM-BS).***

10.10 CO Line Testing

10.11 To test CO line transmission, two or three CO lines must be available at the remote site (see Figure 8 and Table RM-BU).

10.12 CO line testing is accomplished by using all of the following two methods:

1) Establish a talk path between the two remote stations (B & C) via a CO-to-CO connection through STRATA DK8 or DK16.

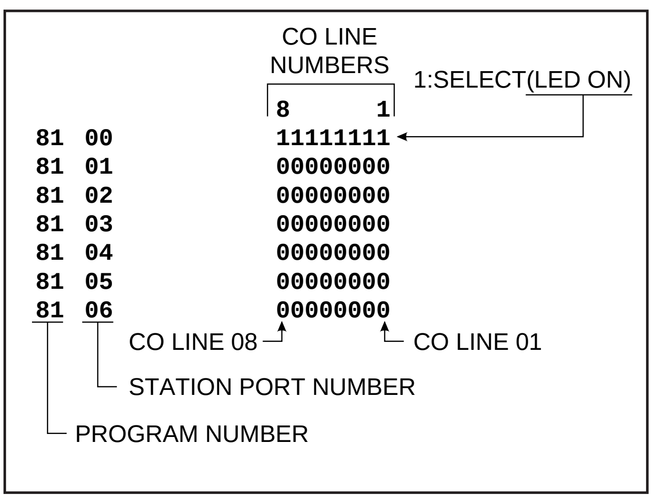


FIGURE 6
DATA DUMP PRINTOUT EXAMPLE

```
>MODE DUMP
D MSG SYS

SYS  M60  OUT TO LUNCH
SYS  M61  IN A MEETING
SYS  M62  CALL
SYS  M63  BACK AT
SYS  M64  RETURN ON
SYS  M65
SYS  M66
SYS  M67
SYS  M68
SYS  M69
D
```

FIGURE 7
SAMPLE PRINTOUT OF SYSTEM MESSAGES

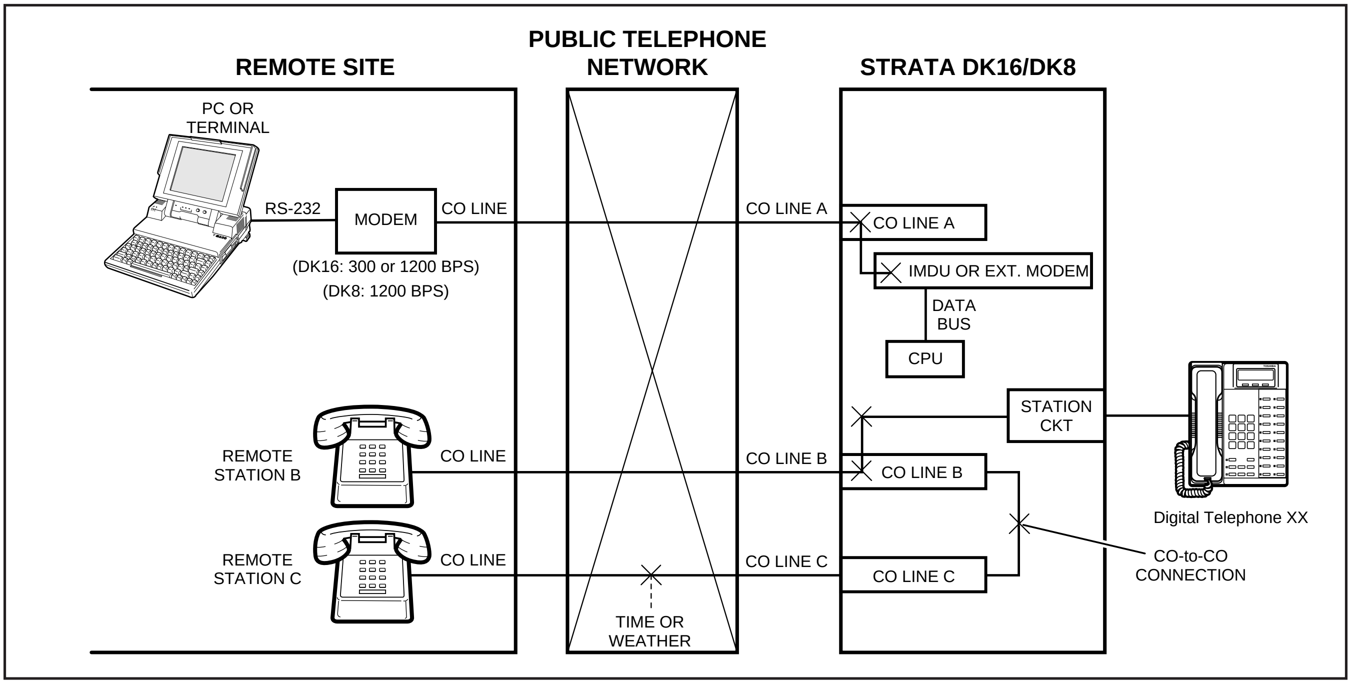


FIGURE 8
TEST MODE FUNCTION DIAGRAM

2) Establish a talk path between a remote station and the time or weather service via a CO-to-CO connection through STRATA DK8 or DK16.

10.13 The procedures in the tables provide examples of the types of tests and functions that can be accomplished with the Test Mode. These procedures do not cover all the possible tests that can be performed remotely; however, by using the principles given, other tests are possible.

11 LCD MESSAGE MODE

11.00 General

11.01 This mode allows a local or remote terminal to set Called and Calling Station LCD messages for station users (see Table RM-BO ~ BR). The messages may be system or station type and are stored in their respective memory locations when set.

11.10 Remote Called Station Message Mode

11.11 Allows the terminal to set a Called Station Message for an originating station with the destination of the message being a station or group of stations.

11.12 When the message is set, the Msg LED(s) on the destination station(s) flash.

11.13 When a destination station calls the originating station, the message is displayed on the destination station's LCD.

Mode 94: To edit and/or review a Called Station Message before setting it, use this mode. It will print out the existing message and allow additions to it (such as a time or a date) before it is set. (The message cannot be changed with this mode—just added to.)

Mode 96: To add or change a Called Station Message before setting it, use this mode. It does not display the existing message, but allows a completely new message to be entered before it is set.

11.20 Remote Calling Station Message Mode

11.21 Allows the terminal to set a Calling Station Message for a station. The message will be set on

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the station's LCD and is automatically displayed on other stations' LCDs whenever they call that station.

Mode 95: To edit and/or review a Calling Station Message before setting it, use this mode. It will display the existing message and allow additions to it (such as a time or a date) before it is set. (The message cannot be changed with this mode—just added to.)

Mode 97: To add or change a Calling Station Message before setting it, use this mode. It does not display the existing message, but allows a completely new message to be entered before it is set.

11.22 Use the procedures in the tables to set messages via Modes 94/96 and 95/97.

12 SPEED DIAL MODE

12.00 General

12.01 The Speed Dial Mode (see Table RM-BW) can be used to add or change speed dial numbers to any of the System Speed Dial memory locations (60 ~ 99) and Station Speed Dial memory locations (10 ~ 49).

12.02 Chain Speed Dial numbers can also be programmed using the Speed Dial Mode. See the Digital or Electronic Telephone User Guide for more information regarding chain Speed Dialing.

12.03 To program Speed Dial numbers, enter the REPT mode per Paragraph **7** of this section. Then use the Speed Dial Mode Procedure at the end of this section.

13 MODE EXIT

13.01 Exit the current mode per Paragraph **13.02** and select the desired mode via Paragraph **7**.

13.02 To exit the Program (PROG), Data Dump (DUMP), Test (TEST) or Speed Dial (REPT) mode:

- At the P, D, T or R prompt, enter Q U I T CR and observe:
  `>MODE`

13.03 To exit the LCD Message (MESG) mode:

- At anytime while in the message mode, enter: m 0 q and observe:
  `>MODE`

NOTE:
To exit the Message Mode, the terminal keyboard must be in lower case.

14 DISCONTINUE OPERATION

14.00 Local Terminal

14.01 Exit current operating mode via Paragraph **13** and observe that the MODE prompt is displayed on the terminal.

14.10 Remote Terminal

14.11 Exit current operating mode via Paragraph **13** and observe that the MODE prompt is displayed on the terminal.

14.12 To discontinue remote operation:

1) Take the terminal off-line.

2) Verify that the modem drops the line.

15 EQUIPMENT COMPATIBILITY

15.01 Equipment that is known to be compatible with STRATA DK8 and DK16 Remote Administration and Maintenance is listed as follows. This list does not show all of the equipment that will work, only the equipment that has been proven compatible in the field or lab.

Terminals
- Texas Instruments: Silent 700
- Panasonic: KXD-4920
- Personal Computers with the PROCOMM communications software package.

Modems
- Hayes compatible

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TABLE RM-D
PROGRAM 90
INITIALIZING PROGRAMS 00 ~ 97

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt enter P R O G CR.	>MODE PROG
2	**Enter Program Number 90** Press CR.	P 90 P90
3	**To Initialize All Programs Enter** 0 0 * 9 7 *NOTE: Single programs can be initialized by entering a single program number plus* #. *Group numbers are separated by an* *.	P90 00*97
4	Enter button/LED number 0 1.	P90 00*97 01 N
5	Change 01 button/LED to "ON" by entering Y.	P90 00*97 01 N Y
6	Press SPACE.	P90 00*97 01 N Y 02 N
7	Change LED 02 to "ON" by entering Y.	P90 00*97 01 N Y 02 N Y
8	Press CR. Initialization complete. *NOTE: If program data is not entered correctly, then* CR *will not respond. To retry, press* DELETE CR.	P90 00*97 01 N 02 N Y P90
9	**Exit Program 90** Press # # CR.	P90 # P
10	**For DK16, Enter Program 77** Press 7 7 CR.	P77
11	Press 1 1 4. then: Y CR.	P77 1 14 N P77 1 14 N Y P77
12	**To Exit this Program:** Press # # CR.	

IMPORTANT NOTE:
<u>For DK16 only:</u> If all programs are initialized, the "IMDU enabled" has also been turned off in **Program 77-1,** ***LED 14. If using the IMDU for remote programming, go into*** **Program 77-1** ***and turn button/LED 14 on as shown in steps 9, 10, and 11. If this is not completed, remote programming must be reactivated locally from the programming digital or electronic telephone.***

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TABLE RM-E
PROGRAM 92
STATION SPEED DIAL, SPEED DIAL MEMO, VM ID CODES INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG`
2	**Enter Program Number 92** Press CR.	`P 92` `P92`
3	Enter 1.	`P92` `P92 1`
4	Enter button/LED number: 0 1.	`P92` `P92 1 01 N`
5	Change LED 01 to “ON” by entering Y.	`P92` `P92 1 01 N Y`
6	Press SPACE two times.	`P92` `P92 1 01 N Y` `      02 N` `      03 N`
7	Change LED 03 to “ON” by entering Y.	`P92` `P92 1 01 N Y` `      02 N` `      03 N Y`
8	Press CR. Initialization complete. *NOTE: If program data is not entered correctly,* CR *will not respond. To retry, press* DELETE CR *at the same time.*	`P92` `P92 1 01 N Y` `      02 N` `      03 N Y` `P92`
9	Clear system speed dial using the procedure on the next page.	

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TABLE RM-F
PROGRAM 92 (continued)
SYSTEM SPEED DIAL, SPEED DIAL MEMO INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG**
2	**Enter Program Number 92** Press CR.	**P 92** **P92**
3	Enter 2.	**P92** **P92 2**
4	Enter button/LED number 0 1.	**P92** **P92 2 01 N**
5	Change LED 01 to "ON" by entering Y.	**P92** **P92 2 01 N Y**
6	Press SPACE three times.	**P92** **P92 2 01 N Y** **02 N** **03 N** **04 N**
7	Change LED 04 to "ON" by entering Y.	**P92** **P92 2 01 N Y** **02 N** **03 N** **04 N Y**
8	Press CR. Initialization complete. *NOTE: If program data is not entered correctly,* CR *will not respond. To retry, press* DELETE CR *at the same time.*	**P92** **P92 2 01 N Y** **02 N** **03 N** **04 N Y** **P92**
9	Clear LCD message memory, using the procedure on the next page.	

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TABLE RM-G
PROGRAM 92 (continued)
LCD CHARACTER MESSAGE MEMORY INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG`
2	**Enter Program Number 92** Press CR.	`P 92` `P92`
3	Enter 3.	`P92` `P92 3`
4	Enter button/LED number 0 2.	`P92` `P92 3 02 N`
5	Change LED 02 to “ON” by entering Y.	`P92` `P92 3 02 N Y`
6	Press SPACE.	`P92` `P92 3 02 N Y` `      03 N`
7	Change LED 03 to “ON” by entering Y.	`P92` `P92 3 02 N Y` `      03 N Y`
8	Press CR. Initialization complete. *NOTE: If program data is not entered correctly,* CR *will not respond. To retry, press* DELETE CR *at the same time.*	`P92` `P92 3 02 N Y` `      03 N Y` `P92`
9	Clear the timed reminders using the procedure on the next page.	

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TABLE RM-H
PROGRAM 92 (continued)
TIMED REMINDERS INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG
2	**Enter Program Number 92** Press CR.	P 92 P92
3	Enter 4.	P92 P92 4
4	Enter button/LED number 0 2.	P92 P92 4 02 N
5	Change LED 02 to "ON" by entering Y.	P92 P92 4 02 N Y
6	Press SPACE two times.	P92 P92 4 02 N Y 03 N 04 N
7	Change key 04 to "ON" by entering Y.	P92 P92 4 02 N Y 03 N 04 N Y
8	Press CR. Initialization complete. *NOTE: If program data is not entered correctly,* CR *will not respond. To retry, press* DELETE CR *at the same time.*	P92 P92 4 02 N Y 03 N 04 N Y P92
9	To exit this program, press # # CR.	

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TABLE RM-I
PROGRAM 92 (continued)
DIGITAL TELEPHONE VOLUME LEVEL INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 92** Press CR.	**P 92** **P92**
3	Enter 5.	**P92 5**
4	Enter 0 1; change button/LED 01 to "ON" by entering Y.	**P92 5 01 N Y**
5	Press SPACE four times.	**P92 5 01 N Y** **02 N** **03 N** **04 N** **05 N**
6	Change LED 05 to “ON” by entering Y. *NOTE: If program data is not entered correctly,* CR *will not respond. To retry, press* DELETE CR *at the same time.*	**P92 5 01 N Y** **02 N** **03 N** **04 N** **05 N Y**
7	Press CR. Initialization complete.	**P92 5 01 N Y** **02 N** **03 N** **04 N** **05 N** **P92**
8	To exit this program, press # # CR.	

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TABLE RM-J
PROGRAM 92 (continued)
CALL FORWARD BACKUP RAM INITIALIZATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG
2	**Enter Program Number 92** Press CR.	P 92 P92
3	Enter 9.	P92 P92 9
4	Enter button/LED number 0 3.	P92 P92 9 03 N
5	Change LED 03 to "ON" by entering Y.	P92 P92 9 03 N Y
6	Press SPACE.	P92 P92 9 03 N Y 04 N
7	Change LED 04 to "ON" by entering Y.	P92 P92 9 03 N Y 04 N Y
8	Press CR. Initialization complete. *NOTE: If program data is not entered correctly,* CR *will not respond. To retry, press* DELETE CR *at the same time*.	P92 P92 9 03 N Y 04 N Y P92
9	To exit this program, press # # CR.	

IMPORTANT NOTE:
This program clears Call Forward memory for all stations, but does not reset the Call Forward indication on the station (Call Forward LCD information and/or Call Forward button/LED). To clear station Call Forward indications, system power must be turned OFF for five seconds, then ON. Fixed Call Forward is not cleared by this program.

TABLE RM-K
PROGRAM 03
SLOT ASSIGNMENTS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 03** Press CR.	P 03 P03
3	**Enter the Slot Number** Refer to the System Record Sheet and enter the desired slot number. Example: Slot number 00, enter 0 0.	P03 P03 00 91
4	**Enter the PCB Code Number** Refer to the System Record Sheet and enter the desired PCB code number. Example: PCB code 92, enter 9 2.	P03 P03 00 91 92
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to Step 3 until all **Program 03** data is entered. C) To exit this program, press # #, press CR.	P03 P03 00 91 92 P03 ## P
6	Turn system power "OFF" for 5 seconds and then turn power "ON" to store data in working memory (see Notes).	Remote maintenance is disconnected.

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IMPORTANT NOTES:

1. ***This program only applies to DK16 and must be completed with on-site assistance (after installing PCBs, if any) because the system must be powered down momentarily after PCB code entry.***
2. ***Even though PCB codes display as being changed, they are not entered into working memory until the system DC power is cycled OFF and ON.***
3. ***If PCB codes are not entered into working memory by cycling DC power, PCB options will not function.***
4. ***Only*** **Program 03** ***requires the system power to be turned OFF and ON to store data into working memory.***

TABLE RM-L
PROGRAM 00
SOFTWARE CHECK/REMOTE MAINTENANCE—SECURITY CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 00** Press CR.	**P 00** **P00**
3	**To Check Software Version** **Enter Action Code 0**. System will display the system's software version. Press CR.	**P00 0 Version = PSSA□·□** **P00** or **Version = QMA □ □** Software version For DK16, PSSA. For DK8, QMA
4	**To Change Level 1 Security Code** **Enter Action Code 1**. The system will display the present level 1, four-digit code. Refer to the System Record Sheet and change if required. Press CR.	**P00 1 0000** **P00**
5	**To Change Level 2 Security Code** **Enter Action Code 2**. The system will display the present level 2, four-digit code. Refer to the System Record Sheet and change if required. Press CR.	**P00 2 0000** **P00**
6	**To Exit This Program** Press # # CR.	**P00 ##** **P**

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TABLE RM-M
PROGRAM 01
LOGICAL PORT DISPLAY

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 01** Press CR.	**P 01** **P01**
3	**Enter the Physical Port Number** Enter the desired physical port number. Example: Port number 01, enter 0 1.	**P01** **P01 01** □□ □□ = Logical Port Displays 01 = Physical Port
4	**Verify Physical Port's Associated Logical Port**	**P01 01** □□ (□□ = Logical Port)
5	**To Display More Ports/Exit Program** A) To display more logical ports, press CR and go to Step 3. B) To exit this program, enter # # CR (twice).	**P01 01** □□ **##** **P01 ##** **P** (after exit)

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TABLE RM-N
PROGRAM 02
PHYSICAL PORT DISPLAY

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 02** Press CR.	**P 02** **P02**
3	**Enter the Logical Port Number** Enter the desired logical port number. Example: Port number 02, enter 0 2.	**P02** **P02 02** □□ □□ = Physical Port Displays 02 = Logical Port
4	**Verify Logical Ports Associated Physical Port**	**P02 02** □□ (□□ = Physical Port)
5	**To Display More Ports/Exit Program** A) To display more physical ports, press CR and go to Step 3. B) To exit this program, enter # # CR (twice).	**P02 02** □□ **##** **P02 ##** **P** (after exit)

TABLE RM-O
PROGRAM 04
PORT/STATION NUMBER ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 04** Press CR.	**P 04** **P04**
3	**Enter the Logical Port Number** Refer to the System Record Sheet and enter the desired logical port number. Example: Port number 01, enter 0 1.	**P04** **P04 01**
4	Press # button. System displays present station number. Refer to the System Record Sheet and enter the desired station number. Example: Station number 16, enter 1 6.	**P04** **P04 01# 11 06**
5	**To Exit Program/Store Data** A) To store data; press CR. B) Continue returning to Step 3 until all **Program 04** data is entered. C) To exit this program, press # # CR.	**P04** **P04 01# 11 06** **P04 ##** **P**

NOTE:
A blank is displayed by "N".

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TABLE RM-P
PROGRAM 05
FLEXIBLE ACCESS CODE NUMBERING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG**
2	**Enter Program Number 05** Press CR.	**P 05** **P05**
3	**Enter Access Code number that you wish to change (0 ~ 9)** Example: 4 (if it was not previously changed, the system will print another 4. If it has been previously changed, the system will print the number to which it was changed).	**P05 4 4**
4	**Change the number if required (one or two digits)** Example: Change to 6, press CR.	**P05 4 4 6**
5	Continue returning to Step 3 until all required access codes have been changed.	
6	**To Exit this Program** Press # # CR.	**P**

NOTE:
***Programs 10-1**, **10-2**, and **10-3** use Type 1 procedure.*

TABLE RM-Q
TYPE 1 PROGRAM PROCEDURE EXAMPLE
(PROGRAMS: 10-1, 10-2, 10-3, 15, 16, 42-0, 77-1, 77-2)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number** Refer to the record sheet and enter the desired program number. Example: **Program 10-1**, enter 1 0, press CR.	**P 10** **P10**
3	**Enter Program Code or Digit(s) Per Record Sheet** 1 or other digit required. *NOTE: Most programs do not require a second digit.*	**P10 1**
4	**Enter Button/LED Number** Enter the desired button/LED number. Example: Button/LED 01, enter 0 1.	**P10 1 01 N** (see note)
5	**To Change Button/LED Status** Refer to the System Record Sheet and change the button/LED status, if required (Y or N). Example: Enter Y.	**P10 1 01 N Y**
6	**To Advance to Next Button/LED** Press SPACE. Repeat step 5 if necessary.	**P10 1 01 Y** **02 N**
7	**To Review Button/LED Status Change** Enter CR. Re-enter Steps 3 and 4. *NOTE: This step is optional and not required to save data.*	**P10 1 01 Y-** Button LED "ON" Button LED Number Program Code Program Number
8	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # #, then press CR. C) Continue returning to step 2 until all Type 1 programs are completed.	**P10** **P10 ##** **P**
9	**To Exit the Program Mode** Press # # CR.	**> MODE**
10	**To Enter Another Mode** Press D U M P CR (data dump) T E S T CR (test) M E S G CR (LCD messages) R E P T CR (speed dial)	 **D** **T** (no prompt) **R**

NOTE:
Y = button/LED "ON", N = button/LED "OFF"

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TABLE RM-R
TYPE 2 PROGRAM PROCEDURE EXAMPLE
(PROGRAMS: 20, 30, 31, 35, 40, 41, 43, 79, 81 ~ 89)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number** Refer to the record sheet and enter the desired program number. Example: **Program 30**, enter 3 0, press CR.	**P 30**
3	**Enter Port Number □□ or Port Range □□ * □□** Refer to the System Record Sheet and enter the desired port number(s). Example: 0 4.	**P30** **P30 04**
4	Press # button.	**P30 04#**
5	**Enter the Desired Button/LED Number** Example: Button/LED 01, enter: 0 1.	**P30 04# 01 N** (Note)
6	**To Change Button/LED Status** Refer to the System Record Sheet and change the button/LED status, if required (Y or N). Example: Enter Y.	**P30 04# 01 N Y**
7	**To Advance to Next Button/LED** Press SPACE (repeat Step 6 if necessary).	
8	**To Review Button/LED Status Change** Press CR. Re-enter Steps 3, 4, and 5.	**P30 04# 01 Y-** LED "ON" Button LED Number (01) Port Number (04#) Program Number (P30)
9	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # #, then press CR. C) Continue returning to Step 2 until all Type 2 programs are completed.	**P10** **P10 ##** **P**
10	**To Exit the Program Mode** Press # # CR.	**>MODE**
11	**To Enter Another Mode,** Press D U M P CR (data dump) T E S T CR (test) M E S G CR (LCD messages) R E P T CR (speed dial)	 **D** **T** (no prompt) **R**

NOTE:
Y = button/LED(s) "ON", N = button/LED(s) "OFF"; U = button/LED(s) "ON" some ports and "OFF" other ports.

TABLE RM-S
PROGRAM 12
SYSTEM ASSIGNMENTS – BASIC TIMING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 12** Press CR.	**P 12** **P12**
3	Check the record sheet and enter the program code that is required. As an example, feature 3, enter 3. The present selection will be displayed.	**P12 3 1**
4	Refer to the record sheet and change if required. As an example, change it to 2. Enter 2.	**P12 3 1 2**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to Step 3 until all **Program 12** data is entered. C) To exit this program, press # # CR.	**P12 3 1 2** **P12 ##** **P**

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TABLE RM-T
PROGRAM 13
DEFINING THE MESSAGE CENTER

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 13** Press CR.	**P 13** **P13**
3	Enter the number 1. The present port number will be displayed.	**P13** **P13 1 NN**
4	Refer to the record sheet and enter the required port number. Example: Port 00, enter 0 0 CR.	**P13 1 NN 00** **P13**
5	**To Exit this Program** Press # # CR.	**P13 1 NN 00** **P13 ##** **P**

NOTES:
1. *A blank is displayed by "N".*
2. ***Programs 15 and 16** use Type 1 procedure.*

TABLE RM-U
PROGRAM 19
BACKGROUND MUSIC SLOT IDENTIFICATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 19** Press CR.	**P 19** **P19**
3	Enter the number 1. The present slot number will be displayed.	**P19** **P19 1 NN**
4	Refer to the record sheet and enter the required slot number. Example: Slot 04, enter 0 4 CR.	**P19 1 NN 04** **P19**
5	**To Exit this Program** Press # # CR.	**P1 19 ##** **P**

NOTE:
Program 20 *uses Type 2 procedure.*

TABLE RM-V
PROGRAM 21
MODEM POOLING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 21** Press CR.	**P 21** **P21**
3	Refer to the System Record Sheet, and enter the required port number for the PDIU-DS. Example: port 04; Enter: 0 4.	**P21 04**
4	Press #. The system will display the presently selected standard telephone port number.	**P21 04 # NN**
5	Refer to the System Record Sheet, and enter the required standard telephone port number. Example: Port 08; Enter: 0 8.	**P21 04 # NN 08**
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to Step 3 until all **Program 21** data is entered. C) To exit this program, press # # CR.	**P21 04 # NN 08** **P21 ##** **P**

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TABLE RM-W
PROGRAM 22
DATA STATION HUNTING (DATA CALL ONLY)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 22** Press CR.	**P 22** **P22**
3	Refer to the record sheet and enter the required port number. Example: Port 03, enter 0 3.	**P22 03**
4	Enter #. The present data will be displayed.	**P22 03# NN**
5	Refer to the record sheet and enter the port number that will be the hunt point. Example: Port 00, enter 0 0.	**P22 03# NN 00**
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 22** data is entered. C) To exit this program, press # # CR.	**P22 03# NN 00** **P22 ##** **P**

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TABLE RM-X
PROGRAM 28
DSS CONSOLE/ATTENDANT TELEPHONE ASSIGNMENTS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 28** Press CR.	**P 28** **P28**
3	Refer to the System Record Sheet and enter the required DSS console number (1 ~ 2). The system will display the telephone to which the DSS console is assigned. Example: DSS console number 1 is assigned to telephone number 1. Refer to the System Record Sheet and change if required. Example: Assign DSS console 1 to electronic telephone 2. Enter: 2.	**P28 1 1 2**
4	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to Step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P28 1 1 2** **P28 ##** **P**

NOTE:
This program applies to digital and electronic DSS consoles and digital and electronic telephones.

TABLE RM-Y
PROGRAM 29
DSS CONSOLE BUTTON ASSIGNMENTS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number** Press 2 9 CR.	**P 29** **P29**
3	**Enter Console Number and Buttonstrip Group Number** Press □ □ Button Group Number (1 ~ 3) Console Number (1 ~ 2)	**P29** □ □
4	**Enter the 2-digit Button Number to be Programmed (01 ~ 20):** □□ (current feature code displays □ □ □ after button entry).	**P29** □ □ □ □ □ □ □ Key code
5	**Enter New (2- or 3-digit) Feature Code** Press □ □ or □ □ □ 3-digit code 2-digit code	**P29** □ □ □ □ □ □ □ □ □ □ Console / Button group / Button No. / Old code / New code
6	Press SPACE to go to next button. or Press CR to store data.	**P29**
7	Continue with Step 3 until all **Program 29** data is entered.	
8	**To Exit this Program** Press # # CR.	

NOTE:
***Programs 30** and **31**, use Type 1 procedure.*

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TABLE RM-Z
PROGRAM 32
AUTOMATIC PREFERENCE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG` `P`
2	**Enter the Program Number 32** Press CR.	`P 32` `P32`
3	Refer to the record sheet and enter the required port number. Example: Port 01, enter 0 1.	`P32 01`
4	Enter #. The present status for this port will be displayed.	`P32 01# 100`
5	Refer to the record sheet and enter the required ringing code. Example: Code 0, enter 0.	`P32 01 # 100 0`
6	Refer to the record sheet and enter the required automatic off-hook code. Example: Code 11, enter 1 1.	`P32 01# 100 011`
7	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 32** data is entered. C) To exit this program, press # # CR.	`P32 01# 100 011` `P32 ##` `P`

TABLE RM-AA
PROGRAM 33
STATION HUNTING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG` `P`
2	**Enter Program Number 33** Press CR.	`P 33` `P33`
3	Refer to the record sheet and enter the required port number. Example: Port 03, enter 0 3.	`P33 03`
4	Enter #. The present data will be displayed.	`P33 03# NN`
5	Refer to the record sheet and enter the port number that will be the hunt point. Example: Port 00, enter 0 0.	`P33 03# NN 00`
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 33** data is entered. C) To exit this program, press # # CR.	`P33 03# NN 00` `P33 ##` `P`

TABLE RM-AB
PROGRAM 34
HOLD RECALL TIMING

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG` `P`
2	**Enter Program Number 34** Press CR.	`P 34` `P34`
3	Refer to the record sheet and enter the required port number. Example: Port 05, enter 0 5.	`P34 05`
4	Press #. The present data will be displayed.	`P34 05# 032`
5	Refer to the record sheet and enter the required timing. Example: 160 seconds, enter 1 6 0.	`P34 05# 032 160`
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 34** data has been entered. C) To exit this program, press # # CR.	`P34 05# 032 160` `P34 ##` `P`

NOTE:
***Program 35**, use Type 2 procedure.*

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TABLE RM-AC
PROGRAM 36
FIXED CALL FORWARD

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG` `P`
2	**Enter Program Number 36** Press CR.	`P 36` `P36`
3	Refer to the System Record Sheet and enter the port number for the station that will have a Fixed Call Forward button. Example: Port 00, enter 0 0.	`P36 00`
4	Press #. The present data will be displayed.	`P36 00# NN`
5	Refer to the System Record Sheet and enter the port to be forwarded to when the Fixed Call Forward button is pressed. Example: Port 04, enter 0 4.	`P36 00# NN 04`
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 36** data is entered. C) To exit this program, press # # CR.	`P36 00# NN 04` `P36 ##` `P`

TABLE RM-AD
PROGRAM 37
RING TRANSFER (CAMP-ON) RECALL TIME

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter the Program Number 37** Press CR.	**P 37** **P37**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 01, enter 0 1.	**P37 01**
4	Press #. System will display the present ring transfer recall time.	**P37 01# 064**
5	Refer to the System Record Sheet and enter the required ring transfer timeout. Example: 70 seconds. Enter 0 7 0.	**P37 01# 064 070**
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 37** data is entered. C) To exit this program, press # # CR.	**P37 01# 064 070** **P37 ##** **P**

TABLE RM-AE
PROGRAM 38
DIGITAL AND ELECTRONIC TELEPHONE BUTTONSTRIP TYPE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter the Program Number 38** Press CR.	P 38 P38
3	Refer to the System Record Sheet and enter the required port number. Example: Port 00, enter 0 0.	P38 00
4	Press #. The system will display the present telephone code.	P38 00# 31
5	Refer to the System Record Sheet and enter the required telephone code number. Example: Code 21, enter 2 1.	P38 00# 31 21
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 38** data is entered. C) To exit this program, press # # CR.	P38 00# 31 21 P38 ## P

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TABLE RM-AF
PROGRAM 39
FLEXIBLE BUTTON ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter the Program Number 39** Press CR.	P 39 P39
3	Refer to the System Record Sheet and enter the required port number. Example: Port 00, enter 0 0.	P39 00
4	Press #.	P39 00#
5	Refer to the System Record Sheet and enter the button number. Example: Button 01, enter 0 1. The system will display the feature code presently assigned to this button.	P39 00# 01 00
6	Refer to the System Record Sheet and enter the required feature code (2 or 3 digits). Example: Code 01, enter 0 1.	P39 00# 01 00 01
7	To select the next button number, press SPACE. Continue returning to step 6 until all port 00 features are programmed.	P39 00# 01 00 01 02 02
8	Press CR to store data.	P39
9	A) Continue returning to step 3 until all **Program 39** data has been entered. B) To exit this program and store data, press # # CR.	P39 00# 01 00 01 02 02 P39 ## P

NOTES:
1. ***Program 40**, **41:** use Type 2 procedure.*
2. ***Program 42-0:** use Type 1 procedure.*

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TABLE RM-AG
PROGRAM 42-1 ~ 8
PBX ACCESS CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 42** Press CR.	**P 42** **P42**
3	Refer to the System Record Sheet and enter the required PBX group number (1 ~ 8). System will display present PBX access code.	**P42 1 NN**
4	Refer to the System Record Sheet and enter the required access code. N = Space # = Don't care Example: 9, enter 9 N.	**P42 1 NN 9N**
5	**To Exit Program/Store Data** A) To store data press CR. B) Return to step 3 to continue in this program. C) To exit this program, press # # CR.	**P42 1 NN 9N** **P42 ##** **P**

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TABLE RM-AH
PROGRAM 60
SMDR OUTPUT/ACCOUNT CODE DIGIT LENGTH

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter PROGCR .	>MODE PROG P
2	**Enter Program Number 60** Press CR .	P 60 P60
3A	**SMDR Threshold Time** **Enter: Item code 2.** The system will display either "0" or "1". "0" indicates that the threshold time is set at 0.1 seconds. "1" indicates 10 seconds. The default is "1". Refer to the System Record Sheet, and enter the correct digit—if it is not already being displayed—and then CR. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to step 4.	P60 21
3B	**Allow SMDR printout.** **Enter: Action code 3.** System will print out "1" if incoming and outgoing calls will be printed on SMDR. A "0" will be printed out if only outgoing calls will be printed. Refer to the System Record Sheet and change (to 1 or 0), if required, and press CR. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to step 4.	P60 3 1 P60
3C	**Set Account Code Digit Length** **Enter: Item code 4.** The system will display the number of digits allowed in the account code. The default is 06. Refer to the System Record Sheet and enter the required number of digits (04 ~ 15) and press CR. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to step 4.	P60 4 06
3D	**SMDR Toll Calls Only** **Enter: Action code 5.** The system will display the presently selected feature (0 ~ 5). The default is 0. Refer to the System Record Sheet and enter the required feature code and press CR. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to step 4.	P60 5 0
3E	**Enter DISA ID Code** **Enter: Item code 6.** System will display last entered ID code number. Default = Blank. Refer to the System Record Sheets, and enter a new code if desired, and then press CR. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to step 4.	P60 6 NNNN
3F	**Credit Card Call Digit Length** **Enter: Item code 7.** The system will display the current digit length. Refer to the System Record Sheet, and enter the desired length, 01 ~ 30 digits, and then CR. Example: 13 digits; enter 1 3 CR. If you wish to change another parameter within this program, enter its associated item code. To exit this program, go to step 4.	P60 7 13
4	**To Exit Program/Store Data** Press # # CR.	P60 6 NNNN P60 ## P

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TABLE RM-AI
PROGRAM 69
VERIFIABLE ACCOUNT CODE ENTRY

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 69** Press CR.	P 69 P69
3	Refer to the System Record Sheet, and enter the required code number (000 ~ 299). Example: code number 001; Enter: 0 0 1. The system will display the present account code number assigned to 001. *Note:* *The number of digits will be as defined in* **Program 60-4**.	P69 001 NNNNNNNNNNNNNNN
4	A) Refer to the System Record Sheets, and enter the required account code number. Example: number 987654; Enter: 9 8 7 6 5 4. B) To clear and erase all data enter (all caps) N N N N N N N N N N N N N N N .	P69 001 NNNNNN 987654
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 69** data is entered. C) To exit this program, press # # CR.	P69 001 NNNNNN 987654 P69 ## P

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TABLE RM-AJ
PROGRAM 70
VERIFY ACCOUNT CODE/TOLL RESTRICTION ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 70** Press CR.	**P 70** **P70**
3	Refer to the System Record Sheet, and enter the required code number (000 ~ 299). Example: code number 002; Enter: 0 0 2. The system will display the present digit Restrict (Y) and Toll Restriction Status (Z) for entered code number.	**P70 002 YZ**
4	Refer to the System Record Sheet, and enter the required digit Restrict and Toll Restriction data. Example: digit Restrict (1) and Toll Restriction (3); Enter: 1 3.	**P70 002 YZ 13**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 70** data is entered. C) To exit this program, press # # CR.	**P70 002 YZ 13** **P70 ##** **P**

NOTE:
Programs 77-1 *and* ***77-2****, use Type 1 procedure.*

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TABLE RM-AK
PROGRAM 78
CO LINE SPECIAL RINGING ASSIGNMENTS-DISA/IMDU/ NIGHT RINGING OVER EXTERNAL PAGE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 78** Press CR.	**P 78** **P78**
3	Refer to the System Record Sheet and enter the feature number for the feature to be programmed. Example: Feature code 1, enter 1.	**P78 1**
4	Refer to the System Record Sheet and enter the code number for the area of the feature being programmed. Example: Code 3, enter 3.	**P78 13**
5	Refer to the System Record Sheet and enter the CO line buttons that will be associated with this feature. Example: CO button 01, enter 0 1. The system will designate whether the CO button/LED is on/off. Refer to the System Record Sheet and change if required. Press SPACE to display next CO button/LED.	**P78 13 01 N** **02 N Y**
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P78 13 01 N** **02 N Y** **P78 ##** **P**

NOTE:
Program 79 *uses Type 2 procedure.*

TABLE RM-AL
PROGRAM 80
DIGITAL AND ELECTRONIC TELEPHONE RINGING TONES

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode.** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 80** Press CR.	**P 80** **P80**
3	Refer to the System Record Sheet and enter the required port number. Example: Port 01, enter 0 1.	**P80 01**
4	Press # key. The system will display 1 or 2 corresponding to tone 1 or tone 2.	**P80 01# 1**
5	Refer to the System Record Sheet and change if required. Example: Tone 2, enter 2.	**P80 01# 1 2**
6	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P80 01# 1 2** **P80 ##** **P**

NOTE:
Programs 81 ~ 89 *use Type 2 procedure.*

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TABLE RM-AM
PROGRAM 93
CO LINE IDENTIFICATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 93** Press CR.	**P 93** **P93**
3	**Enter Action Code 1** Refer to the System Record Sheet and enter the appropriate CO line number. Example: CO line 2, enter 0 2. The system will display previously entered identification characters (up to 16 characters).	**P93 1 02** □□□ *(up to 16)* Current I.D.
4	Refer to the System Record Sheet and change identification if required: □□..........□□ (16 characters maximum). Example: OVERSEAS.	**P93 1 02** □□□ *(up to 16)* **OVERSEAS**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P93 1 02** □□□ *(up to 16)* **OVERSEAS** **P93 ##** **P**

NOTE:
Use SPACE *to clear characters.*

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TABLE RM-AN
PROGRAM 44 (A OR B)
TOLL RESTRICTION TRAVELING CLASS OVERRIDE CODE ENTRY

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 44** (Do not enter A or B) Press CR.	**P 44** **P44**
3	Refer to the System Record Sheet and enter the required Toll Restriction Class number (1 ~ 4). Example: Class 1; Enter: 1. The system will display the present override code assigned to that class number.	**P44 1 NNNN**
4	Refer to the System Record Sheet and enter the required override code number. Example: 3456; Enter 3 4 5 6.	**P44 1 NNNN 3456**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all **Program 44** data is entered. C) To exit this program, press # # CR.	**P44 1 NNNN 3456** **P44 ##** **P**

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TABLE RM-AO
PROGRAM 45-1
TOLL RESTRICTION DIAL PLAN

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 45** Press CR.	**P 45** **P45**
3	**Enter the number 1.** The system will display the present dial plan code number (1 ~ 5).	**P45 1 1**
4	Refer to the record sheet and enter the required code number. Example: Code 2, enter 2.	**P45 1 1 2**
5	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	**P45 1 1 2** **P45 ##** **P**

TABLE RM-AP
PROGRAM 45-2
TOLL RESTRICTION DISABLE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 45** Press CR.	**P 45** **P45**
3	Enter the number 2.	**P45 2**
4	Refer to the record sheet and enter the required CO line number. Example: CO line 01, enter 0 1. The system will display N or Y to define if the LED is on or off.	**P45 2 01 N**
5	Refer to the System Record Sheet and change the CO line status as required (Y or N). Press SPACE to step to next CO line number.	**P45 2 01 N Y** **02 N**
6	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	**P45 2 01 N Y** **02 N** **P45 ##** **P**

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TABLE RM-AQ
PROGRAM 45-3 ~ 6
EQUAL ACCESS, SPECIAL COMMON CARRIER NUMBERS, and AUTHORIZATION CODE DIGIT LENGTH

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 45** Press CR.	**P 45** **P45**
3	Refer to the record sheet and enter the item number (3 ~ 6). Example: Item 3, enter 3. The system will display the present equal access number or EA1 Code.	**P45 3 NNNNN**
4	Refer to the System Record Sheet and enter the required number. Example: 12345, enter 1 2 3 4 5 CR.	**P45 3 NNNNN 12345** **P45**
5	Enter code number 4. The system will display present authorization code digit length. Refer to the System Record Sheet and enter the required authorization code number digit length. Example: 12, enter: 1 2 CR.	**P45 4 00 12** **P45**
6	To exit this program, press # # CR.	**P45 ##** **P**

NOTE:
Items 5 and 6 are entered the same way as 3 and 4, respectively.

TABLE RM-AR
PROGRAM 45-8 ~ 9
TOLL RESTRICTION OVERRIDE CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter the Program Number 45** Press CR.	P 45 P45
3	Refer to the System Record Sheet and enter 8 or 9 for the desired code number. The system will display the present override code number.	P45 8 NNNN
4	Refer to the record sheet and enter a new number if required. Example: 1234. Enter: 1 2 3 4.	P45 8 NNNN 1234
5	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	P45 8 NNNN 1234 P45 ## P

TABLE RM-AS
PROGRAM 46–2 ~ 4
TOLL RESTRICTION ALLOWED/DENIED AREA CODES ASSIGNED BY CLASS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 46** Press CR.	P 46 P46
3	Enter class number (1 ~ 4).	P46 □ Class Number
4	Enter 2, 3, or 4 SPACE • 2 — to add codes to memory (allow). • 3 — to delete codes from memory (deny). • 4 SPACE — to display codes in memory (allowed codes).	P46 □ □ 2, 3 or 4 ALLOW? or DENY?
5	Refer to the System Record Sheet and enter the area code or area code group. Single □□□. Group □□□ * □□□. Press SPACE to enter more codes.	P46 X Y ALLOW □□□ – □□□ or DENY
6	Press SPACE to temporarily store data. Press CR when completed.	P46
7	Continue returning to step 3 until all data input is completed for this program.	
8	**To Exit this Program** Press # # CR.	P46 ## P

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TABLE RM-AT
PROGRAM 46-6 ~ 8
TOLL RESTRICTION ALLOWED/DENIED OFFICE CODES ASSIGNED BY CLASS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 46** Press CR.	**P 46** **P46**
3	Enter class number (1 ~ 4).	**P46** □ └ Class Number (X)
4	Enter 6, 7, or 8 SPACE. • 6 — to add codes to memory (allowed). • 7 — to delete codes from memory (deny). • 8 SPACE — to display codes in memory (allowed codes).	**P46** □ □ └ 6, 7, or 8 (Y)
5	Refer to the System Record Sheet and enter the office code or office code group. Single □□□. Group □□□ * □□□ . Press SPACE to enter more codes.	**P46 X Y** **ALLOW** □□□ **-** □□□ **or DENY**
6	Press SPACE to temporarily store data. Press SPACE when completed.	**P46**
7	Continue returning to step 3 until all data input is completed for this program.	
8	**To Exit this Program** Press # # CR.	**P46 ##** **P**

TABLE RM-AU
PROGRAM 46-10 ~ 40
TOLL RESTRICTION CLASS PARAMETERS

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG` `P`
2	**Enter Program Number 46** Press CR.	`P 46` `P46`
3	Refer to the System Record Sheet and enter the Toll Restriction class number (1 ~ 4). Then enter the number 0. Example: Class 1, enter 1 0.	`P46 10`
4	Refer to the System Record Sheet and enter the required button/LED number. Example: Button number 11, enter 1 1. The system will display the status of the button/LED.	`P46 10 11 TABLE 1N`
5	Refer to the System Record Sheet and change if required (Y or N). To access next button number, press SPACE.	`P46 10 11 TABLE1 N Y` `12 TABLE2 N`
6	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	`P46 10 11 TABLE1 N Y` `12 TABLE2 N` `P46 ##` `P`

TABLE RM-AV
PROGRAM 47
TOLL RESTRICTION EXCEPTION OFFICE CODES ASSIGNED BY AREA CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 47** Press CR.	**P 47** **P47**
3	Enter exception table (1 ~ 8) and press 1.	**P47 Y 1 AREA CODE NNN**
4	Refer to the System Record Sheet and enter the required area code and press CR. Example: AC 714, enter 7 1 4 CR.	**P47 Y 1 AREA CODE NNN 714** **P47**
5a	**To Add Exception Office Codes to Table** • Enter exception table (1 ~ 8) and press 2. • Enter exception codes □□□ or □□□ * □□□ . • Press SPACE to add more codes. • Press SPACE CR to store codes.	**P47** □2 **Except** **Except** □□□
5b	**To Delete Exception Office Codes from Table** • Enter exception table (1 ~ 8) and press 3. • Enter exception codes □□□ or □□□ * □□□ . • Press SPACE to delete more codes. • Press SPACE CR to store codes.	**P47** □3 **Delete** **Delete** □□□
5c	**To Display Exception Office Codes in Table** • Enter exception table (1 ~ 8) and press 4 SPACE. • Press SPACE to display more codes. • Press CR to exit display.	**P47** □4 **Except** □□□
6	**To Exit Program/Store Data:** # # CR.	**P47 Y 2** **Except** □□□ **P47 ##** **P**

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TABLE RM-AW
PROGRAM 48
STATION TOLL RESTRICTION CLASSIFICATION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 48** Press CR.	P 48 P48
3	Refer to the System Record Sheet and enter the required port number. Example: Port 00, enter 0 0.	P48 00
4	Press # key. The system will display the present data as a two-digit code: The first digit designates digit free or digit restrict. The second digit is the station restriction code. Refer to the System Record Sheet and change if required.	P48 00# 13
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data is recorded for this program. C) To exit this program, press # # CR.	P48 00# 13 P48 ## P

TABLE RM-AX
PROGRAM 50-1
LCR PARAMETERS

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STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 50.** Press CR.	P 50 P50
3	Enter 1. Refer to the System Record Sheet and enter the required button/LED number. Example: Button 01, enter 0 1.	P50 1 01 N
4	Refer to the System Record Sheet and change button/LED status, if required. Press SPACE to move to next button/LED.	P50 1 01 N 02 N
5	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	P50 1 01 N 02 N P50 ## P

TABLE RM-AY
PROGRAM 50-2
LCR HOME AREA CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press CR.	**P 50** **P50**
3	Enter the number 2. The system will display the last area code programmed. Refer to the System Record Sheet and change if required.	**P50 2 NNN**
4	**To Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	**P50 2 NNN** **P50 ##** **P**

TABLE RM-AZ
PROGRAM 50-31 ~ 35
LCR SPECIAL CODES

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press CR.	**P 50** **P50**
3	Refer to the System Record Sheet and enter 31 ~ 35 as required. Example: 31, enter 3 1. System will display previously programmed number. Refer to the System Record Sheet and change if required.	**P50 31 NNNN**
4	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data for this program has been entered. C) To exit this program, press # # CR.	**P50 31 NNNN** **P50 ##** **P**

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TABLE RM-BA
PROGRAM 50-4
LCR LDI PLAN NUMBER

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press CR.	**P 50** **P50**
3	**Enter the number** 4 The system will display the present LDI route number. Refer to the System Record Sheet and change if required.	**P50 4 1**
4	**Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	**P50 4 1** **P50 ##** **P**

TABLE RM-BB
PROGRAM 50-5
LCR LOCAL CALL PLAN NUMBER

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press CR.	**P 50** **P50**
3	**Enter the number** 5 The system will display the present local route plan number. Refer to the System Record Sheet and change if required. Example: 2, enter 2.	**P50 5 1 2**
4	**Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	**P50 5 1 2** **P50 ##** **P**

TABLE RM-BC
PROGRAM 50-6
LCR DIAL ZERO TIMEOUT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 50** Press CR.	**P 50** **P50**
3	**Enter the number** 6 The system will display the present dial zero timeout. Refer to the System Record Sheet and change if required. Example: 10, enter 1 0.	**P50 6 06 10**
4	**Exit Program/Store Data** A) To store data, press CR. B) To exit this program, press # # CR.	**P50 6 06 10** **P50 ##** **P**

TABLE RM-BD
PROGRAM 51
LCR AREA CODES

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 51** Press CR.	**P 51** **P51**
3	Refer to the System Record Sheet and enter the required route plan number (1 ~ 8). Example: Route plan 1, enter 1.	**P51 1**
4	Enter 2, 3, or 4 SPACE • 2 — To add area codes to table. • 3 — To delete area codes from table. • 4 SPACE — to display area codes in table, continue to press SPACE to display more codes. Press CR to exit display.	**P51**□□ – 2, 3 or 4 Plan No. **P51**□□ □□□ <— CODES
5	Enter codes □□□ or □□□ * □□□ and press SPACE after each code entry.	**P51**□□ □□□ □□□
6	**Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P51 12** **212** **or** □□□-□□□ **P51 ##** **P**

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TABLE RM-BE
PROGRAM 52
LCR OFFICE CODE EXCEPTIONS FOR SPECIFIED AREA CODE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 52** Press CR.	P 52 P52
3	**Define Route Plan Number** Refer to the System Record Sheet and enter the exception table number (1 ~ 8). Example: Table 1, enter 1. **Enter Action code** 0. The system will print out the currently defined route plan number. Refer to the System Record Sheet and enter new plan number if required. Example: Change to 3.	P52 10 □ 3 LCR Plan No. Action Code Exception Table No.
4	**Define Area Code Number** Press CR. Enter exception table number (1 ~ 8) defined in step 3. **Enter Action code** 1. The system will print out the currently defined area code number. Refer to the System Record Sheet and enter the new area code number if required. Example: Change to 212, enter 2 1 2. Press CR.	P52 11□□□ 212 P52 Area Code Action Code Exception Table No.
5	**Display Office Codes** Enter exception table number defined in step 3. **Enter Action code** 4. Press SPACE to display previously selected office codes. Continually press SPACE until all previously selected codes have been displayed, then press CR.	P52 14 □□□-□□□ □□□ Office Codes
6	**To Add (2) or Delete (3) Office Codes** Press CR. Enter exception table number defined in step 3. Refer to the System Record Sheets and enter 2 to add office codes or 3 to delete office codes. Example: Add office codes 300-325 Enter 2 (or 3) 3 0 0 * 3 2 5 CR.	P52 12 300-325 P52
7	**To Exit Program/Store Data** A) Data was stored when CR was pressed in step 6. B) Continue returning to step 3 until all data is entered for this program. C) To exit this program. Press # # CR.	P52 ## P

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TABLE RM-BF
PROGRAM 53
LCR SCHEDULE ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	>MODE PROG P
2	**Enter Program Number 53** Press CR.	P 53 P53
3	**Define Route Plan Number** Refer to the System Record Sheet and enter the route plan number (1 ~ 8). Example: Route Plan 1, enter 1.	P53 1
4	**Define Schedule Number** Refer to the System Record Sheet and enter the required schedule number (1 ~ 3). Example: Schedule 1, enter 1.	P53 11
5	**Enter Code Number 0** The system will display the previously selected time for the route plan number (step 3) and the schedule number (step 4). Refer to the System Record Sheet and change the time if required. Example: Change to 0800. Enter 0 8 0 0. Press CR and repeat steps 3, 4, and 5 for all plans/schedules. *NOTE: Enter time using 24-hour format:* H H M M.	P53 110 0000 0800 P53
6	**Priority Class Assignment** Enter the route plan number as defined in step 3. Enter the schedule number as defined in step 4. Refer to the System Record Sheet and enter the required station group number (1 ~ 4). Example: Group 1, enter 1. The system will display the previously entered route definition numbers (reference **Program 54**). Refer to the System Record Sheet and enter required route definition numbers (1 ~ 4) and press CR. Example: Enter 1 and 2 CR. Continue to repeat steps 3, 4, and 6 until all plans/schedules are entered.	P53 111 NNNN 12 P53
7	**To Exit Program/Store Data** A) Data was stored when pressing CR in step 6. B) Continue returning to step 3 until all data is entered for this program. C) To exit this program. Press # # CR.	P53 ## P

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TABLE RM-BG
PROGRAM 54
LCR ROUTE DEFINITION

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	`>MODE PROG` `P`
2	**Enter Program Number 54** Press CR.	`P 54` `P54`
3	**Enter Route Plan Number** Refer to the System Record Sheet and enter the required route plan number (1 ~ 8). Example: Route plan 1, enter 1.	`P54 1`
4	**Enter Route Definition Number** Refer to the System Record Sheet and enter the required route definition number (1 ~ 4). Example: Enter route definition number 2, enter 2. The system will display the previously entered CO line group number (1 ~ 8) and the modified digits table number (1 ~ 6). Refer to the System Record Sheet and enter the CO line group and modified digit numbers as required, then press CR. Example: Change the CO line group number to 3 and the modified digits table to 2. Enter: 3 2 CR.	`P54 12 11 32` Modified Digit Table No. CO Line Group No. Route Definition No. Plan No.
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	`P54 12 11 32` `P54 ##` `P`

TABLE RM-BH
PROGRAM 55-0
LCR MODIFIED DIGITS-DELETE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 55** Press CR.	**P 55** **P55**
3	**Enter Modified Digits Table Number** Refer to the System Record Sheet and enter the modified digits table number (1 ~ 6). Example: Enter modified digits table number 1, enter 1.	**P55 1**
4	**Enter Code 0** The system will display any previously entered number of digits to be deleted (01 ~ 10). Refer to the System Record Sheet and change number if required. Example: Change to 10, enter: 1 0.	**P55 10 05 10**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P55 10 05 10** **P55 ##** **P**

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TABLE RM-BI
PROGRAM 55-1
LCR MODIFIED DIGITS-ADD

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 55** Press CR.	**P 55** **P55**
3	**Enter Modified Digits Table Number** Refer to the System Record Sheet and enter the required modified digits table number (1 ~ 6). Example: Enter table number 1, enter 1.	**P55 1**
4	**Enter Code 1** The system will display any previously entered digits (up to 22). Refer to the System Record Sheet and enter new numbers, if required. Example: Enter 1 2 3 4 P 3. *NOTE: Pause codes may also be entered. To enter pauses, press "P" plus the pause number (1 ~ 8).* Special Code Input Pause = P 1 ~ P 8. Tone = T at beginning of digits to convert. Clear = C as first digit, then CR.	**P55 11□□□** *(up to 22 digits)* **1 2 3 4 P3**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P55 11□□□□** **1 2 3 4 P3** **P55 ##** **P**

TABLE RM-BJ
PROGRAM 55-2
LCR MODIFIED DIGITS-END

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 55** Press CR.	**P 55** **P55**
3	**Enter Modified Digits Table Number** Refer to the System Record Sheet and enter the required modified digits table number (1 ~ 6). Example: Enter table number 1, enter 1.	**P55 1**
4	**Enter Code 2** The system will display any previously entered digits (up to 22). Refer to the System Record Sheet and enter new numbers, if required. Example: Enter 1 2 3 4 P 3. *NOTE: Pause codes may also be entered. To enter pauses, press "P" plus the pause number (1 ~ 8).* Special Code Input Pause = P 1 ~ P 8. Tone = T at beginning of digits to convert. Clear = C as first digit, then CR.	**P55 12** □□□ *(up to 22 digits)* **1 2 3 4 P3**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P55 12** □□□□ *(up to 22 digits)* **1 2 3 4 P3** **P55 ##** **P**

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TABLE RM-BK
PROGRAM 56
LCR STATION GROUP ASSIGNMENT

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter Program Mode** At the >MODE prompt, enter P R O G CR.	**>MODE PROG** **P**
2	**Enter Program Number 56** Press CR.	**P 56** **P56**
3	**Enter Port Number** Refer to the System Record Sheet and enter the required port number, □□ or □□ * □□. Example: Port 01, enter 0 1.	**P56 01**
4	**Press # Key** (if single port □□ entry in step 3). The system will display any previously entered group number (1 ~ 4). Refer to the System Record Sheet and change as required. Example: Change to 4, enter 4.	**P56 01# 1 4**
5	**To Exit Program/Store Data** A) To store data, press CR. B) Continue returning to step 3 until all data has been entered for this program. C) To exit this program, press # # CR.	**P56 01# 1 4** **P56 ##** **P**

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TABLE RM-BL
PROGRAM DATA DUMP

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Data Dump Mode** At the >MODE prompt, enter D U M P CR.	**>MODE DUMP** **D**
2	**To Output Program Data** Enter P R G □□ CR □□ = Program number or A L L for all programs.	**D PROG □□**
3	**To Stop Printout at Any Time** Enter DELETE CR at the same time.	**D**
4	**To Exit the Dump Mode** Enter Q U I T CR.	**>MODE**

TABLE RM-BM
SPEED DIALING DATA DUMP

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Data Dump Mode** At the >MODE prompt, enter D U M P CR.	**>MODE DUMP** **D**
2	**To Output Speed Dialing Data** Enter R E P □□□ CR ---or--- R E P □□ CR □□□ = A L L or S Y S □□ = Port number for individual station speed dial.	
3	**To Stop Printout at Any Time** Enter DELETE CR at the same time.	**D**
4	**To Exit the Dump Mode** Enter Q U I T CR.	

TABLE RM-BN
LCD MESSAGING DATA DUMP

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Data Dump Mode** At the >MODE prompt, enter D U M P CR.	**>MODE DUMP**
2	**To Output Message Data** Enter M S G □□□ CR ---or--- M S G □□ CR □□□ = A L L or S Y S □□ = Port number of individual station.	**D MSG □□□**
3	**To Stop Printout at Any Time** Enter DELETE CR at the same time.	**D**
4	**To Exit the Dump Mode** Enter Q U I T CR.	**>MODE**

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TABLE RM-BO
MODE 95
REMOTE CALLING STATION MESSAGING (ADD/REVIEW/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter M E S G CR.	`>MODE MESG`
2	**To Add Or Review a Calling Station Message** Set the terminal keyboard to the lower case (cap lock off) and enter m 9 5. *NOTE:* *Enter "m" anytime it is desired to start over in this procedure.*	`m 95`
3	Enter X X X (XXX = station number where the message will be set and stored).	`m95 XXX`
4	Enter p □□ (p = page command and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system message). *NOTES:* *1. To store system messages permanently, DKT or EKT XXX must be the station at port 00.* *2. After p □□ is entered, the previously stored message is displayed. If there is no stored message, nothing is displayed.*	`m95 XXX p □□ [M]`
5	**To Change Previous Message** Set the terminal keyboard to upper case and change message (alphanumeric, 32 characters max.).	`m95 XXX p □□ [M+]`
6	**To Set the Message on DKT or EKT XXX's LCD** Set the terminal keyboard to lower case and enter p m 0.	`m95 XXX p □□ [M+] p` `m 0` └ Zero
7	**To Exit the Message Mode** At any time, enter m 0 q (lower case).	`m 0` `q` `> MODE`

NOTES:
1. *To cancel a message set via Mode 95, use Mode 97 procedure.*
2. *[M] represents the message entered.*
3. *DKT = digital telephone; EKT = electronic telephone.*

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TABLE RM-BP
MODE 97
REMOTE CALLING STATION MESSAGING (ADD/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter M E S G CR.	`>MODE MESG`
2	**To Add a Message** (or change a previously stored message) Set the terminal keyboard to lower case (caps lock off) and enter m 9 7. *NOTE:* *Enter "m" at anytime it is desired to start over in this procedure.*	`m 97`
3	Enter X X X (XXX = station number for which the message will be set and stored).	`m97 XXX`
4	Enter: p □□ (p = page command and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system messages). *NOTE:* *To store system message change permanently, DKT or EKT XXX must be station assigned to port 00.*	`m97 XXX p □□`
5	**To Add a Message** Set the terminal keyboard to upper case and enter message (alphanumeric, 32 characters max.). New message displays as it is entered.	`m97 XXX p □□ [M]`
6	**To Set the Message on the DKT/EKT LCD** Set the terminal keyboard to lower case and enter p m 0.	`m97 XXX p □□ [M] p` `m 0` (Zero)
7	**To Exit the Message Mode** At any time, enter m 0 q (lower case).	`m 0` `q` `>MODE`

NOTES:
1. *To cancel a message set via Mode 95, use Mode 97 with any message number in step 4 and skip step 5.*
2. *[M] represents the message entered.*
3. *DKT = digital telephone; EKT = electronic telephone.*

TABLE RM-BQ
MODE 94
REMOTE CALLED STATION MESSAGING (ADD/REVIEW/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter M E S G CR.	**>MODE MESG**
2	**To Add Or Review a Called Station Message** Set the terminal keyboard to the lower case (cap lock off) and enter m 9 4.	**m 94**
3	Enter X X X (XXX = Destination station number or destination group number [30 = all stations, 31-34 per system, **Program 31**]).	**m94 XXX**
4	Enter p Y Y Y (p = page command [lower case] and Y Y Y = originating station number).	**m94 XXX p YYY**
5	Enter p □□ (p = page command [lower case] and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system messages). After p □□ is entered, the previously stored message (M) is displayed. (If there is no stored message, nothing is displayed.)	**m94 XXX p YYY p □□ [M]**
6	**To Change the Message (M+)** Set the terminal keyboard to upper case and change message as required (alphanumeric, 32 characters max. for total message).	**m94 XXX p YYY p □□ [M+]**
7	**To Set Message** Set the terminal keyboard to lower case and enter p m 0. Destination station: Msg LED flashes, "CALL YYYM" is displayed. Origination station: "SENT XXXM" is displayed.	**m94 XXX p YYY p □□ [M+] p m 0** Zero
8	**To Exit the Message Mode** At any time, enter m 0 q (lower case).	**m 0** **q** **>MODE**

NOTES:
1. *Press* **m** *at any time to start over.*
2. *[M] represents the message entered.*

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TABLE RM-BR
MODE 96
REMOTE CALLED STATION MESSAGING (ADD/CHANGE)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Message Mode** At the >MODE prompt, enter M E S G CR.	`>MODE MESG`
2	**To Change or Add a New Called Station Message** Set the terminal keyboard to the lower case (cap lock off) and enter m 9 6. *NOTE:* *Enter "m" (lower case) anytime it is desired to start over in this procedure.*	`m 96`
3	Enter X X X (XXX = destination station number or destination station group number – 30 = all DKTs/EKTs, 31 ~ 34 per system, **Program 31**).	`m96 XXX`
4	Enter p Y Y Y (p = page command and YYY = originating station number).	`m96 XXX p YYY`
5	Enter p □□ (p = page command and □□ = 2-digit message memory location: 10 ~ 19 personal messages and 60 ~ 99 = system messages).	`m96 XXX p YYY p□□`
6	**To Add the New Message [M]** Set the terminal keyboard to upper case and enter message as required (alphanumeric, 32 characters max.). New message displays as it is entered.	`m96 XXX p YYY p□□[M]`
7	**To Set the Message** Set the terminal keyboard to lower case and enter p m 0. Destination station: Msg LED flashes, "CALL YYYM" is displayed on LCD. Origination station: "SENT XXXM" is displayed on LCD.	`m96 XXX p YYY p□□[M] p` `m 0` (0 = Zero)
8	**To Exit the Message Mode** At any time, enter m 0 p (lower case).	`m 0` `q` `>MODE`

NOTES:
1. *[M] represents the message entered.*
2. *DKT = digital telephone; EKT = electronic telephone.*

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TABLE RM-BS
STATION/CO LINE STATUS CHECK

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter T E S T CR.	`>MODE TEST`
2	**To Check Station Line Status** Enter S E K T X X (X X = port number). Possible status: Idle on-hook, idle off-hook, busy on-hook, busy off-hook. ***IMPORTANT!*** ***To prevent service interference, station line status must be idle on-hook before initiating a test from that station.***	`T SEKT XX IDLE ON-HOOK` `T`
3	**To Check CO Line Status** Enter S C O Y Y (Y Y = CO line number). Possible status: Idle, busy.	`T SCOYY – BUSY` `T`
4	**To Exit the Test Mode** At the T prompt, enter Q U I T CR.	`T QUIT` `> MODE`

TABLE RM-BT
GENERAL STATION ACCESS AND BUTTON ACTIVATION

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STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter T E S T CR.	`>MODE TEST` `T`
2	**To Activate A Button** Enter T K X X K Y Y CR. XX = Port number and YY = button number. *NOTE: Button numbers begin at 01.*	`T TKXX KYY` `T`
3	**To Activate A Function Button** Enter T K X X F CR F = function button designator SPKR S HOLD H CONF C MIC M F = S, H, C, M	`TTKXX F` `T`
4	**To Access A CO Line (via CO Access Code) and Dial Out** Enter T K X X K 0 1 A A A □□□□□□□ CR. AAA = 1, 2, or 3-digit CO line access code and □ = telephone number.	`TTKXX K01 AAA □□□□□□□` `T`
5	**To Access A CO Line (via CO Line Button) and Dial Out** Enter T K X X K Y Y □□□□□□□ CR. YY = CO line number. Telephone Number	`TTKXX KYY □□□□□□□` `T`
6	**To Exit the Test Mode** At T prompt, enter Q U I T CR.	

TABLE RM-BU
CO LINE TEST

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter T E S T CR.	`>MODE TEST`
2	**To Verify Station/CO Line Status** Station line status, enter S E K T X X (X X = station port). CO line status, enter S C O Y Y (Y Y = CO line number).	`T SEKT XX IDLE ON-HOOK` `T` `T SCO YY IDLE`
3	**Call Remote Station B** (from SEKT XX and CO line YY) Enter T K X X K Y Y □□□□□□□CR. (□ = station B's telephone number) Answer station B. *NOTE:* *If the system is equipped with Music-on-hold, go to step 4. If the line must be tested via a CO-to-CO connection, go to step 6.*	`T TK XX KYY` □□□□□□□ `T`
4	A) Press the Hold button on TK XX (station B on hold). Enter T K X X H CR. B) Listen at station B and check that the transmission from the music source is acceptable. C) Press the Spkr button on TKXX (to release the call). Enter T K X X S CR.	`T TKXX H` `T` `T TKXX S` `T`
5	Continue returning to step 2 until all CO lines are tested.	
6	**To Set Up A CO-to-CO Connection** Press the Cnf/Trn button on T K X X. Enter T K X X C CR. *NOTES:* *1. Station B is connected via step 3.* *2. Verify that **Program 15-5** allows CO-to-CO connections.* *3. The next step must be completed immediately to avoid dial tone timeout.*	`T TKXX C` `T`
7	Call station C (or local time/weather) via CO line C. Enter: T K X X K Y Y □□□□□□□CR. X X = CO line C's button number and □ = telephone number of station C. Answer station C (or verify time/weather connection) and go to next step.	`T TKXX KYY` □□□□□□□ `T`
8	Press the Cnf/Trn button on STXX to establish a conference between all parties.	`T TKXX C` `T`
9	If you wish to tie the two CO lines together and hang up: Enter T K X X C CR. Enter T K X X S CR.	`T TKXX C` `TTKXX S` `T`
10	Continue returning to step 2 until all CO lines are tested.	
11	**To Exit the Test Mode,** At the T prompt, enter Q U I T CR.	

TABLE RM-BV
SYSTEM DATE/DAY/TIME SETTING PROCEDURE

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Test Mode** At the >MODE prompt, enter T E S T CR.	**>MODE TEST** **T**
2	**To Set Date** Enter T K 0 0 K 0 1 6 5 1 Y Y M M D D # CR.	**T TK00 K01 651YYMMDD#** **T**
3	**To Set Time Of Day** Enter T K 0 0 K 0 1 6 5 2 H H M M S S # CR.	**TTK00 K01 652HHMMSS#**
4	**To Set Day Of The Week** Enter T K 0 0 K 0 1 6 5 3 D # CR. (D = day of week with Sunday = 1 ~ Saturday = 7)	**TTK00 K01 653D#** **T**
5	**To Exit the Test Mode** At T prompt, enter Q U I T CR.	

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TABLE RM-BW
SPEED DIAL MODE (CHANGE/REVIEW)

STEP	ACTION	DISPLAY/PRINTOUT
1	**Enter the Speed Dial Mode** At the >MODE prompt, enter R E P T CR.	**>MODE REPT**
2	**Enter the station port number for which the speed dial number will be programmed** Press □□ └ (00 ~ 19) *NOTE: If programming system speed dial, enter port number* 0 0.	**R** □□ └ Station Port Number
3	**Enter Speed Dial Memory Location to be Programmed** A) Press □□ (current memory will display) └ 10 ~ 49 Station 60 ~ 99 System B) Press SPACE to review each memory location or go to Step 4.	**R** □□ □□ **N** Memory location / Nothing in memory
4	**1) To enter speed dial number (20 digits max)** 20-digit number Press □□..........□□ **2) To enter chain dial number** 17-digit number Press A □□ □...........□□ └ System speed dial location (90 ~ 99) (Refer to Digital or Electronic Telephone User Guide for information regarding chain dialing.) Special Entries: F=Flash; P=1.5 or 3-sec Pause (Prog. 12); L=10-sec Pause; N=Clear Memory. Special code entry: I = Intercom H = Hold C = Conference	**R** □□ □□ **N** □□..........□□ New speed dial number
5	**To store data, press** CR *NOTE: If program entry is not correct,* CR *will not respond. To try again, press* DELETE CR *at the same time.*	**R**
6	**To Exit the Speed Dial Mode** Press Q U I T CR.	**>MODE**

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REMOTE MAINTENANCE PROCEDURES INDEX

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MESSAGE RECORD SHEET—Use several sheets if necessary

MESG.#______

MESG.#______

MESG.#______

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